Nokia Customer Care

Service Manual

RM-140 (Nokia 7390)

Mobile Terminal

Part No: 9250831 (Issue 1)

COMPANY CONFIDENTIAL

NOKIA

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Amendment Record Sheet

Amendment No	Date	Inserted By	Comments
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Warnings and cautions

Warnings

- IF THE DEVICE CAN BE INSTALLED IN A VEHICLE, CARE MUST BE TAKEN ON INSTALLATION IN VEHICLES FITTED WITH ELECTRONIC ENGINE MANAGEMENT SYSTEMS AND ANTI-SKID BRAKING SYSTEMS. UNDER CERTAIN FAULT CONDITIONS, EMITTED RF ENERGY CAN AFFECT THEIR OPERATION. IF NECESSARY, CONSULT THE VEHICLE DEALER/ MANUFACTURER TO DETERMINE THE IMMUNITY OF VEHICLE ELECTRONIC SYSTEMS TO RF ENERGY.
- THE PRODUCT MUST NOT BE OPERATED IN AREAS LIKELY TO CONTAIN POTENTIALLY EXPLOSIVE ATMOSPHERES, FOR EXAMPLE, PETROL STATIONS (SERVICE STATIONS), BLASTING AREAS ETC.
- OPERATION OF ANY RADIO TRANSMITTING EQUIPMENT, INCLUDING CELLULAR TELEPHONES, MAY INTERFERE WITH THE FUNCTIONALITY OF INADEQUATELY PROTECTED MEDICAL DEVICES. CONSULT A PHYSICIAN OR THE MANUFACTURER OF THE MEDICAL DEVICE IF YOU HAVE ANY QUESTIONS. OTHER ELECTRONIC EQUIPMENT MAY ALSO BE SUBJECT TO INTERFERENCE.
- BEFORE MAKING ANY TEST CONNECTIONS, MAKE SURE YOU HAVE SWITCHED OFF ALL EQUIPMENT.

Cautions

- Servicing and alignment must be undertaken by qualified personnel only.
- Ensure all work is carried out at an anti-static workstation and that an anti-static wrist strap is worn.
- Ensure solder, wire, or foreign matter does not enter the telephone as damage may result.
- Use only approved components as specified in the parts list.
- Ensure all components, modules, screws and insulators are correctly re-fitted after servicing and alignment.
- Ensure all cables and wires are repositioned correctly.
- Never test a mobile phone WCDMA transmitter with full Tx power, if there is no possibility to perform the measurements in a good performance RF-shielded room. Even low power WCDMA transmitters may disturb nearby WCDMA networks and cause problems to 3G cellular phone communication in a wide area.
- During testing never activate the GSM or WCDMA transmitter without a proper antenna load, otherwise GSM or WCDMA PA may be damaged.

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For your safety

QUALIFIED SERVICE

Only qualified personnel may install or repair phone equipment.

ACCESSORIES AND BATTERIES

Use only approved accessories and batteries. Do not connect incompatible products.

CONNECTING TO OTHER DEVICES

When connecting to any other device, read its user's guide for detailed safety instructions. Do not connect incompatible products.

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Care and maintenance

This product is of superior design and craftsmanship and should be treated with care. The suggestions below will help you to fulfil any warranty obligations and to enjoy this product for many years.

- Keep the phone and all its parts and accessories out of the reach of small children.
- Keep the phone dry. Precipitation, humidity and all types of liquids or moisture can contain minerals that will corrode electronic circuits.
- Do not use or store the phone in dusty, dirty areas. Its moving parts can be damaged.
- Do not store the phone in hot areas. High temperatures can shorten the life of electronic devices, damage batteries, and warp or melt certain plastics.
- Do not store the phone in cold areas. When it warms up (to its normal temperature), moisture can form inside, which may damage electronic circuit boards.
- Do not drop, knock or shake the phone. Rough handling can break internal circuit boards.
- Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the phone.
- Do not paint the phone. Paint can clog the moving parts and prevent proper operation.
- Use only the supplied or an approved replacement antenna. Unauthorised antennas, modifications or attachments could damage the phone and may violate regulations governing radio devices.

All of the above suggestions apply equally to the product, battery, charger or any accessory.

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ESD protection

Nokia requires that service points have sufficient ESD protection (against static electricity) when servicing the phone.

Any product of which the covers are removed must be handled with ESD protection. The SIM card can be replaced without ESD protection if the product is otherwise ready for use.

To replace the covers ESD protection must be applied.

All electronic parts of the product are susceptible to ESD. Resistors, too, can be damaged by static electricity discharge.

All ESD sensitive parts must be packed in metallized protective bags during shipping and handling outside any ESD Protected Area (EPA).

Every repair action involving opening the product or handling the product components must be done under ESD protection.

ESD protected spare part packages MUST NOT be opened/closed out of an ESD Protected Area.

For more information and local requirements about ESD protection and ESD Protected Area, contact your local Nokia After Market Services representative.

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Battery information

Note: A new battery's full performance is achieved only after two or three complete charge and discharge cycles!

The battery can be charged and discharged hundreds of times but it will eventually wear out. When the operating time (talk-time and standby time) is noticeably shorter than normal, it is time to buy a new battery.

Use only batteries approved by the phone manufacturer and recharge the battery only with the chargers approved by the manufacturer. Unplug the charger when not in use. Do not leave the battery connected to a charger for longer than a week, since overcharging may shorten its lifetime. If left unused a fully charged battery will discharge itself over time.

Temperature extremes can affect the ability of your battery to charge.

For good operation times with Ni-Cd/NiMh batteries, discharge the battery from time to time by leaving the product switched on until it turns itself off (or by using the battery discharge facility of any approved accessory available for the product). Do not attempt to discharge the battery by any other means.

Use the battery only for its intended purpose.

Never use any charger or battery which is damaged.

Do not short-circuit the battery. Accidental short-circuiting can occur when a metallic object (coin, clip or pen) causes direct connection of the + and - terminals of the battery (metal strips on the battery) for example when you carry a spare battery in your pocket or purse. Short-circuiting the terminals may damage the battery or the connecting object.

Leaving the battery in hot or cold places, such as in a closed car in summer or winter conditions, will reduce the capacity and lifetime of the battery. Always try to keep the battery between 15°C and 25°C (59°F and 77°F). A phone with a hot or cold battery may temporarily not work, even when the battery is fully charged. Batteries' performance is particularly limited in temperatures well below freezing.

Do not dispose of batteries in a fire!

Dispose of batteries according to local regulations (e.g. recycling). Do not dispose as household waste.

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Our policy is of continuous development; details of all technical modifications will be included with service bulletins.

While every endeavour has been made to ensure the accuracy of this document, some errors may exist. If any errors are found by the reader, NOKIA MOBILE PHONES Business Group should be notified in writing/e-mail.

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Please send to:

NOKIA CORPORATION

Nokia Mobile Phones Business Group

Nokia Customer Care

PO Box 86

FIN-24101 SALO

Finland

E-mail: Service.Manuals@nokia.com

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Nokia 7390 Service Manual Structure

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3 Service Software Instructions
4 Service Tools and Service Concepts
5 Disassembly and reassembly instructions
6 BB Troubleshooting and Manual Tuning Guide
7 RF troubleshooting
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9 Schematics
Glossary

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1 — General information

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Product selection

RM-140 (Nokia 7390) is a WCDMA/GSM dual mode phone, supporting WCDMA 2100 (UMTS) and EGSM900/1800/1900 bands.

Key Features:

- Fold design
- 2 displays; one main and one small
- 3 megapixel camera with autofocus and integrated flash
- VGA camera for video calls

Phone features

Display and keypad features

- QVGA main display in 16 million colors
- 160 x 128 pixels mini display in 262,144 colors
- Side volume keys with zoom functionality
- Dedicated camera key with autofocus

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- Power on/off key

Hardware features

- 3-megapixel camera landscape mode and 8x digital zoom
- VGA camera for video calls
- Mini USB port
- AV connector
- 2 mm charger plug interface
- Bluetooth
- USB
- FM radio
- MP3 player
- Internal vibrator
- Plug-in SIM (1.8 V and 3.0 V)
- Real time clock

RF features

- WCDMA 2100
- GSM/EDGE 900/1800/1900
- EDGE: Class 11
- GPRS: Class 11
- HSCSD
- CSD

Software and User interface features

Software features

- ISA OS 8.0s Platform
- Series 40 3rd edition User Interface (UI): Java MIDP 2.0

UI features

Imaging	• 3 megapixel camera with autofocus • 3GPP H.263 playback and streaming
Multimedia	• Playback for the following video formats: 3GPP, H.263 video, MPEG-4 • Integrated FM radio • Integrated music player for MP3/AAC/M4A/eAAC+/AAC+ formats
Memory functions	• 128 MB memory card • Options to expand memory up to 2 GB with microSD card

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Messaging	• Multimedia messaging: MMS for creating, receiving, editing, and sending videos and pictures with AMR voice clips • Email: Supports SMTP, POP3, IMAP4, and APOP protocols. Support for attachments (view jpeg, 3gp, MP3, .ppt, .doc, excel, and .pdf files) • Text messaging: Supports concatenated SMS, picture messaging, SMS distribution list • Presence-enhanced contacts: Check the online status of your friends before you call them • Audio messaging: Record your own voice message and send to compatible devices • Nokia Xpress audio messaging: Send a spontaneously recorded voice clip via MMS • Instant Messaging and Presence-enhanced contacts
Games	Music quiz, Snake, 3D race game
Java applications	Java & APIs: MIDP2.0, JSR139 (CLDC1.1), JSR75 (file connection and PIM), JSR135, JSR184 (3D), JSR82 (BT)
Ringing tones	• Supported file formats: MP3, MPEG4, AAC, eAAC+, WMA files and AMR voice, 64-chord/voice polyphonic MIDI ringing tones • Video ringtones
Connectivity	• Bluetooth • Infrared (IR)
Browsing	WAP* 2.0, XHTML browser over HTTP/TCP/IP stack
Data transfer	• EDGE (EGPRS): MSC 11 (RX+TX 4+3, 3+2) (max 5 slots) • GPRS: MSC 11 (RX+TX: 4+3, 3+2) (max 5 slots) • HSCSD (High-Speed Circuit-Switched Data)* / CSD (Circuit-Switched Data)
Digital services	Music and video streaming services
Voice features	• Voice dialing • Voice commands • Voice recorder
Personal Information Management (PIM)	• Alarm clock • Stopwatch • Calculator • Calendar
Other features	Internal antenna

Accessories

Sales package contents

- Nokia 7390 phone
- Nokia Battery BP-5M
- Nokia Standard Charger AC-3

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- Nokia Headset HS-60
- Nokia Connectivity Cable DKE-2
- User Guide

Table 1 Battery and chargers

Type	Name
Note: This phone is charged through the smaller Nokia standard interface (2.0 mm plug). The 3.5 mm standard charger can be used together with the CA-44 charger adapter.	
AC-3	Compact charger
AC-4	Travel performance charger
BP-5M	Battery 900 mAh Li-Ion
CA-44	Charger adapter (from 3.5 mm -> 2 mm)

Table 2 Car accessories

Type	Name
HF-6W	Wireless plug-in handsfree
CK-1W	Wireless car kit
CK-7W	Advanced Car Kit
DC-4	Mobile charger
N616	Car kit

Table 3 Headsets

Type	Name
HDW-3	Wireless headset
HS-11W	Wireless headset
HS-12W	Wireless headset
HS-13W	Wireless headset
HS-21W	Wireless clip-on headset
HS-24W	Wireless headset
HS-25W	Wireless headset
HS-26W	Wireless headset
HS-34W	Wireless stereo headset
HS-36W	Wireless headset
HS-37W	Wireless headset
HS-39W	Wireless stereo headset
HS-40	Headset (wired)
HS-47	Stereo headset (wired)

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Type	Name
HS-4W	Wireless boom headset
HS-50W	Wireless headset
HS-51W	Wireless headset
HS-52W	Wireless headset
HS-57W	Wireless headset
HS-58W	Wireless headset
HS-59W	Wireless headset
HS-60	Fashion stereo headset (wired)

Table 4 Memory

Type	Name
DKE-2	USB cable
MU-22	1 GB µSD card
MU-26	128 MB µSD card
MU-27	256 MB µSD card
MU-28	512 MB µSD card
MU-37	2 GB µSD card

Specifications

General specifications

Unit	Dimension (mm)	Weight (g)	Volume (cc)
RM-140 Transceiver with BP-5M 900 mAh Li-Ion battery pack	90 x 47 x 10	115	78

Battery endurance

Battery	Talk time	Standby time
BP-5M 900 mAh Li-ion	GSM: up to 3 hours WCDMA: up to 2.5 hours	Up to 220 hours

Note: Variation in operation times will occur depending on SIM card, network settings and usage. Talk time is increased by up to 30% if half rate is active, and reduced by 5% if enhanced full rate is active.

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2 — Parts and layouts

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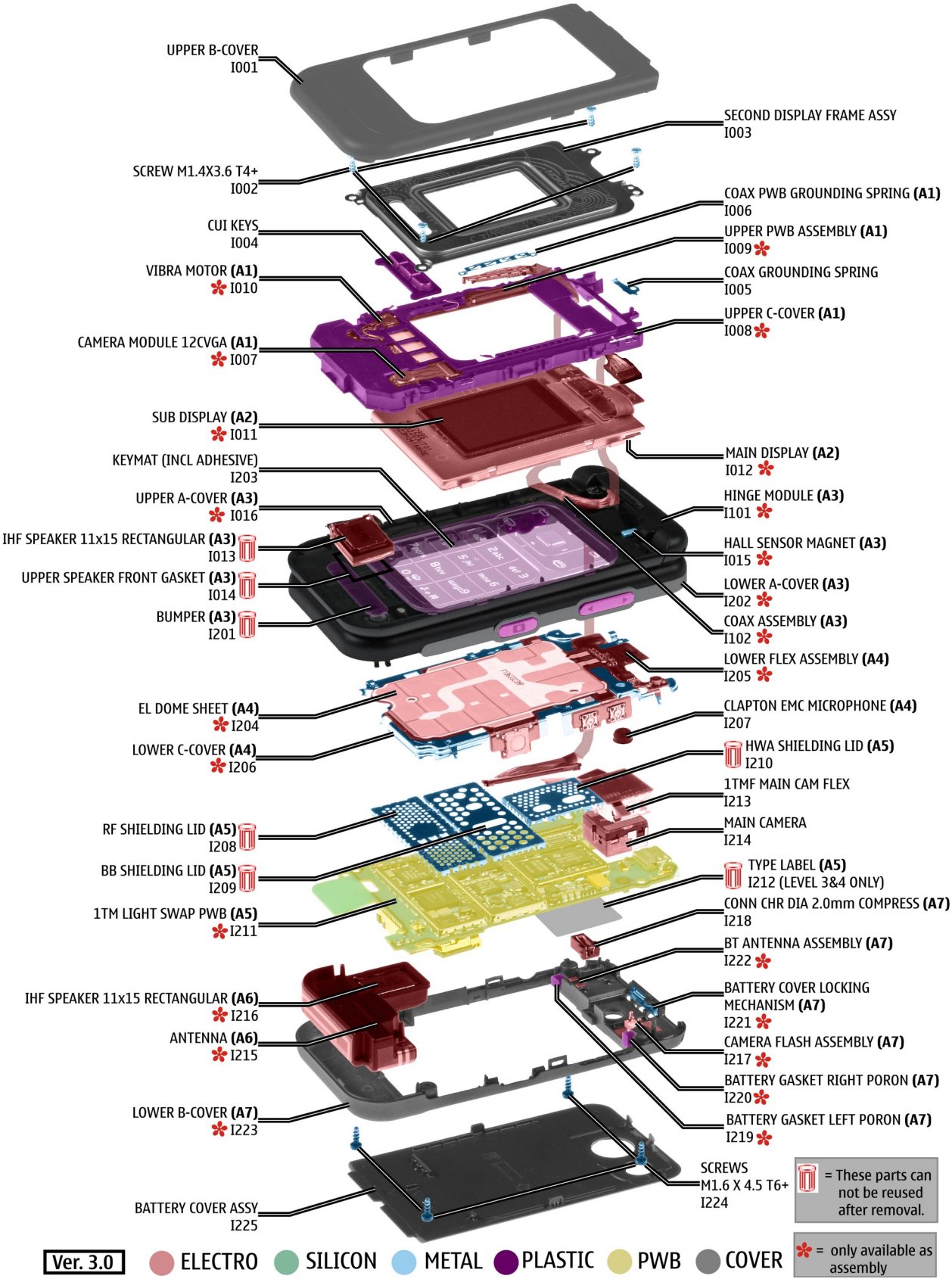
Exploded view



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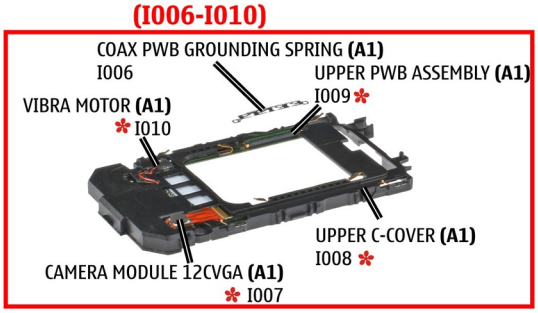
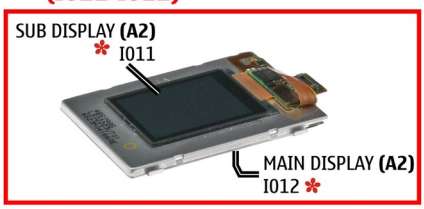
Spare parts overview

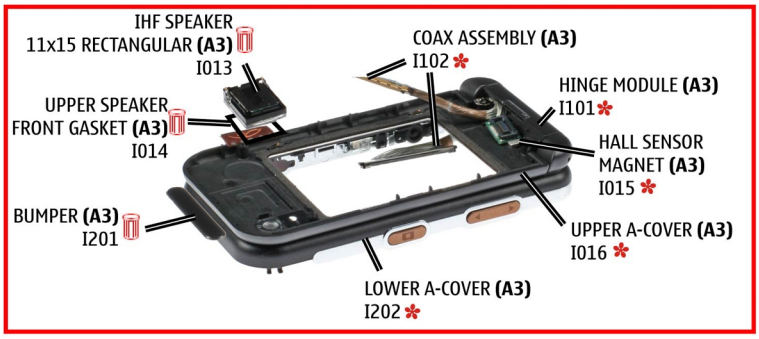
A1=UPPER C-COVER ASSY (I006-I010)



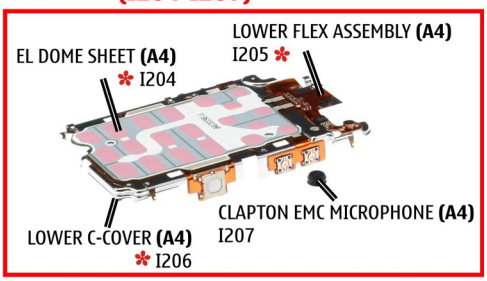
A2=LCD AM QVGA+128x160 COF 16Mco Napa Sh (I011-I012)



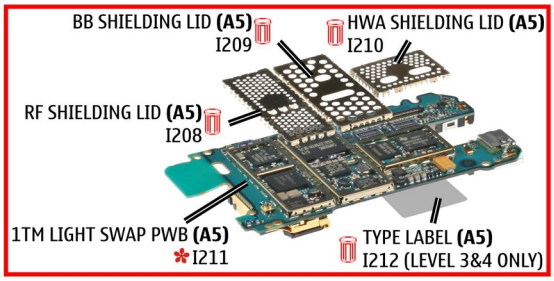
A3=A-COVER ASSY (I013-I016, I101-I102, I201-I202)



A4=LOWER C-OVER ASSY (I204-I207)



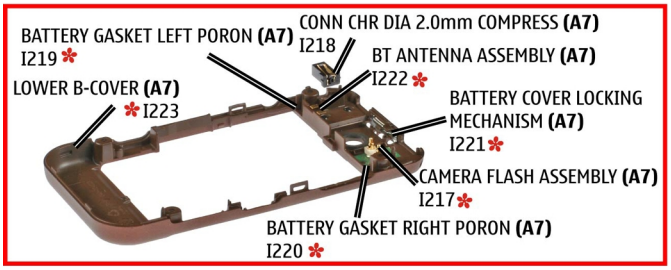
A5=1TM LIGHT SWAP PACKAGE (LEVEL 3&4 ONLY) (I208-I212)

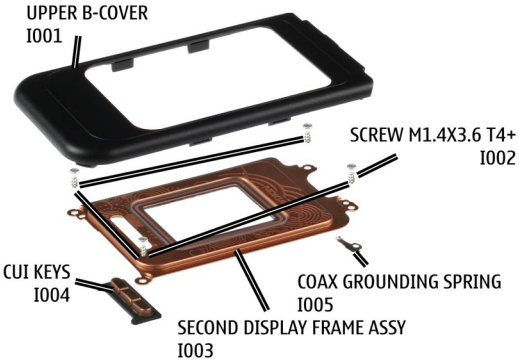


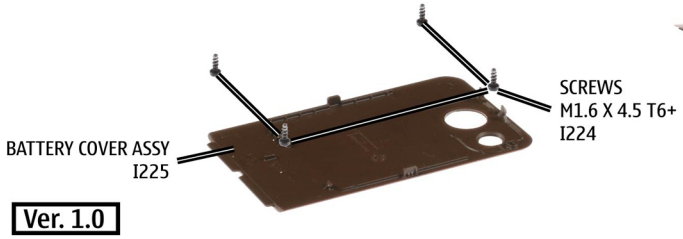
A6=ANTENNA ASSY (I215-I216)

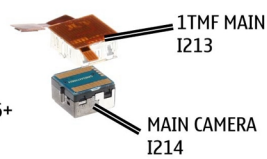
KEYMAT (INCL ADHESIVE)
I203

A7=LOWER B-COVER ASSY (I217-I223)









= These parts can not be reused after removal.

* = only available as assembly

Ver. 1.0

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Mechanical parts list

Table 5 Mechanical parts list

Note: For product codes and variants, please refer to the latest Service bulletin.

ITEM	QTY	PART NAME	Comment
I001	1	UPPER B-COVER Assembly	
I002	4	SCREWS M1.4 X 3.6 T4+	
I003	1	SECOND DISPLAY FRAME ASSY	
I004	1	CUI keys	
I005	1	COAX GROUNDING SPRING	
A1	1	UPPER C-COVER ASSY(I006-I010)	
I006	1	COAX PWB GROUNDING SPRING	
I007	1	CAMERA MOD 12C VGA	
I008	1	UPPER C-COVER	
I009	1	UPPER PWB ASSEMBLY	
I010	1	VIBRA MOTOR	
A2	1	LCD AM QVGA+128x160 COF 16Mco Napa Sh (I011-I012)	
I011	1	SUB DISPLAY	
I012	1	MAIN DISPLAY	
A3	1	A-COVER ASSY(I013-I016, I101-I102, I201-I202)	
I013	1	IHF SPEAKER 11x15 RECTANGULAR	Must be replaced after disassembly
I014		UPPER SPEAKER FRONT GASKET	Must be replaced after disassembly
I015	1	HALL SENSOR MAGNET	
I016	1	UPPER A-COVER	
I101	1	HINGE MODULE	
I102	1	COAX ASSEMBLY	
I201	1	BUMPER BLACK	
I201	1	BUMPER WHITE	Must be replaced after disassembly
I202	1	LOWER A-COVER	Must be replaced after disassembly
I203	1	Keymat Assembly	

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ITEM	QTY	PART NAME	Comment
A4	1	LOWER C-COVER ASSY(I204 - I207)	
I204	1	EL DOME SHEET	
I205	1	LOWER FLEX ASSEMBLY	
I206	1	LOWER C-COVER	
I207	1	CLAPTON EMC MICROPHONE	
A5	1	1TM LIGHT SWAP PACKAGE(I208 - I212)	
I208	1	RF SHIELDING LID	Must be replaced after disassembly
I209	1	BB SHIELDING LID	Must be replaced after disassembly
I210	1	HWA SHIELDING LID	Must be replaced after disassembly
I211	1	1TM LIGHT SWAP PWB	
I212	1	TYPE LABEL	Must be replaced after disassembly
I213	1	1TMF MAIN CAM FLEX	
I214	1	MAIN CAMERA	
A6	1	ANTENNA ASSY(I215 - I216)	
I215	1	ANTENNA	
I216	1	IHF SPEAKER 11x15 RECTANGULAR	
A7	1	LOWER B-COVER ASSY(I217 - I223)	
I217	1	CAMERA FLASH ASSEMBLY	
I218	1	CONN CHR DIA 2.0MM COMPRESS	
I219	1	BATTERY GASKET LEFT PORON	
I220	1	BATTERY GASKET RIGHT PORON	
I221	1	BATTERY COVER LOCKING MECHANISM	
I222	1	BT ANTENNA ASSEMBLY	
I223	1	LOWER B-COVER	
I224	4	SCREWS M1.6 X 4.5 T6+	
I225	1	Battery cover assembly	

Swap units

Table 6 Swap phones

Note: For product codes, please refer to the latest Service bulletin.

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Swap phones
N7390 RM-140 SWAP PHONE E&A BLACK BRONZE
N7390 RM-140 SWAP PHONE RSA BLACK BRONZE
N7390 RM-140 SWAP PHONE FRA BLACK BRONZE
N7390 RM-140 SWAP PHONE TUR BLACK BRONZE
N7390 RM-140 SWAP PHONE ISR BLACK BRONZE
N7390 RM-140 SWAP PHONE UAE BLACK BRONZE
N7390 RM-140 SWAP PHONE RUS BLACK BRONZE
N7390 RM-140 SWAP PHONE UKR BLACK BRONZE
N7390 RM-140 SWAP PHONE BLR BLACK BRONZE
N7390 RM-140 SWAP PHONE E&A POWDER PINK
N7390 RM-140 SWAP PHONE RSA POWDER PINK
N7390 RM-140 SWAP PHONE FRA POWDER PINK
N7390 RM-140 SWAP PHONE TUR POWDER PINK
N7390 RM-140 SWAP PHONE ISR POWDER PINK
N7390 RM-140 SWAP PHONE UAE POWDER PINK
N7390 RM-140 SWAP PHONE GRE POWDER PINK
N7390 RM-140 SWAP PHONE RUS POWDER PINK
N7390 RM-140 SWAP PHONE UKR POWDER PINK
N7390 RM-140 SWAP PHONE BLR POWDER PINK
N7390 RM-140 SWAP PHONE GRE BLACK BRONZE

Table 7 Light swap

Note: For product codes, please refer to the latest Service bulletin.

Light swap
RM-140 LIGHT SWAP EURO-C
RM-140 LIGHT SWAP EURO-C FRANCE
RM-140 LIGHT SWAP EURO-C TURKEY
RM-140 LIGHT SWAP EURO-I BELARUS
RM-140 LIGHT SWAP EURO-I UKRANE
RM-140 LIGHT SWAP EURO-I RUSS
RM-140 LIGHT SWAP EURO-C MEA 13 SA
RM-140 LIGHT SWAP APAC-U TH
RM-140 LIGHT SWAP LATIN APAC-T PH
RM-140 LIGHT SWAP BOPO CHINA-P CTV_TW

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Component parts list

Table 8 Replaceable component parts

Note: For product codes, please refer to the latest Service bulletin.

Item	Side	XY	Object Name
A2200	T	I5	BB SHIELD ASSEMBLY
A3300	T	M5	HWA SHIELD ASSEMBLY
A7500	T	F5	RF SHIELD ASSEMBLY
B2200	T	J5	CRYSTAL 32.768KHZ +/-20PPM 12.5PF
C0001			CHIPCAP NP0 5P6 C 50V 0402
C2000	B	O9	CHIPCAP NP0 27P J 50V 0402
C2002	T	Q8	CHIPCAP NP0 27P J 50V 0402
C2003	B	O9	CHIPCAP FEEDTHRU 100N M 25V 0805
C2004	T	P8	CHIPCAP NETWORK X5R 2X1U5 K 6V3 0405
C2005	T	Q8	CHIPCAP X5R 2U2 K 6V3 0603
C2006	T	P8	CHIPCAP X5R 2U2 K 6V3 0603
C2007	T	Q8	CHIPCAP X5R 2U2 K 6V3 0603
C2008	T	Q7	CHIPCAP NP0 18P J 50V 0402
C2009	T	Q7	CHIPCAP NP0 18P J 50V 0402
C2012	B	O9	CHIPCAP X5R 470N K 25V 0603
C2013	T	P7	CHIPCAP X7R 10N K 16V 0402
C2014	T	O7	CHIPCAP X7R 10N K 16V 0402
C2070	T	N2	CHIPTCAP 150U M 10V 6X3.2X1.5
C2106	T	F9	CHIPCAP NP0 27P J 50V 0402
C2107	T	G9	CHIPCAP NP0 27P J 50V 0402
C2111	T	G9	CHIPCAP NP0 27P J 50V 0402
C2112	T	H9	CHIPCAP NP0 27P J 50V 0402
C2117	T	I9	CHIPCAP X5R 100N K 10V 0402
C2118	T	I9	CHIPCAP X5R 100N K 10V 0402
C2119	T	I9	CHIPCAP X5R 100N K 10V 0402
C2120	T	I9	CHIPCAP X5R 100N K 10V 0402
C2124	T	I9	CHIPCAP X5R 100N K 10V 0402
C2126	T	I9	CHIPCAP X5R 10U M 6V3 0805
C2127	T	I9	CHIPCAP X5R 1U K 6V3 0603
C2170	T	H1	CHIPCAP X7R 1N0 K 50V 0402
C2171	T	H1	CHIPCAP X7R 1N0 K 50V 0402

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Item	Side	XY	Object Name
C2172	T	H1	CHIPCAP X7R 1N0 K 50V 0402
C2201	T	I5	CHIPCAP X5R 1U5 K 4V 0402
C2202	T	H4	CHIPCAP X5R 2U2 K 6V3 0603
C2203	T	I4	CHIPCAP X5R 2U2 K 6V3 0603
C2205	T	I4	CHIPCAP X7R 1N0 J 50V 0402
C2211	T	H5	CHIPCAP X5R 4U7 K 10V 0805
C2213	T	I5	CHIPCAP NETWORK X5R 2X1U5 K 6V3 0405
C2215	T	I5	CHIPCAP NETWORK X5R 2X1U5 K 6V3 0405
C2216	T	J5	CHIPCAP X5R 1U5 K 4V 0402
C2217	T	I4	CHIPCAP X5R 1U5 K 4V 0402
C2220	T	H4	CHIPCAP NETWORK X5R 2X1U5 K 6V3 0405
C2222	T	H5	CHIPCAP X5R 1U K 6V3 0603
C2225	T	J5	CHIPCAP X5R 1U K 6V3 0603
C2226	T	H5	CHIPCAP X5R 1U K 6V3 0603
C2227	T	I5	CHIPCAP NETWORK X5R 2X1U5 K 6V3 0405
C2228	T	H5	CHIPCAP NETWORK X5R 2X1U5 K 6V3 0405
C2231	T	H4	CHIPCAP X5R 10UF 6V3 0603
C2232	T	H5	CHIPCAP NETWORK X5R 2X1U5 K 6V3 0405
C2300	T	H3	CHIPCAP X7R 10N K 16V 0402
C2301	T	I2	CHIPCAP X5R 22U M 6V3 0805
C2302	T	I2	CHIPCAP X5R 22U M 6V3 0805
C2303	T	J2	CHIPCAP X5R 1U K 6V3 0603
C2304	T	I2	CHIPCAP X7R 10N K 16V 0402
C2307	T	J3	CHIPCAP X5R 1U K 6V3 0603
C2309	T	H3	CHIPCAP X5R 22U M 6V3 0805
C2312	T	J3	CHIPCAP NETWORK X5R 2X1U5 K 6V3 0405
C2314	T	I3	CHIPCAP X5R 4U7 M 25V 0805
C2405	T	K9	CHIPCAP X5R 1U K 6V3 0603
C2406	T	K9	CHIPCAP X5R 1U K 6V3 0603
C2407	T	L8	CHIPCAP NP0 27P J 50V 0402
C2408	T	L8	CHIPCAP NP0 27P J 50V 0402
C2409	T	M8	CHIPCAP NP0 27P J 50V 0402
C2550			CHIPCAP NP0 27P J 50V 0402
C2551			CHIPCAP X5R 1U K 6V3 0603
C2552			CHIPCAP NP0 56P J 50V 0402

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Item	Side	XY	Object Name
C2553			CHIPCAP X7R 6N8 K 25V 0402
C2554			CHIPCAP X5R 1U K 6V3 0402
C2555			CHIPCAP X7R 2N2 J 50V 0402
C2556			CHIPCAP X7R 2N2 J 50V 0402
C2557			CHIPCAP X7R 2N2 J 50V 0402
C2558			CHIPCAP X7R 2N2 J 50V 0402
C2600	T	E9	CHIPCAP X5R 4U7 K 10V 0805
C2601	T	E9	CHIPCAP NP0 27P J 50V 0402
C2602	T	E9	CHIPCAP X5R 100N K 10V 0402
C2700	B	F6	CHIPCAP X5R 100N K 10V 0402
C2701	B	F6	CHIPCAP NP0 27P J 50V 0402
C2702	B	E6	CHIPCAP NP0 10P J 50V 0402
C2703	B	E6	CHIPCAP NP0 10P J 50V 0402
C2704	B	E3	CHIPCAP NP0 10P J 50V 0402
C2800	T	I6	CHIPCAP X5R 100N K 16V 0402
C2801	T	H8	CHIPCAP X5R 100N K 16V 0402
C2802	T	H6	CHIPCAP X5R 100N K 16V 0402
C2803	T	H8	CHIPCAP X5R 100N K 16V 0402
C2804	T	H8	CHIPCAP X5R 100N K 16V 0402
C2805	T	H6	CHIPCAP X5R 100N K 16V 0402
C2806	T	I8	CHIPCAP X5R 100N K 16V 0402
C2807	T	J7	CHIPCAP X5R 100N K 16V 0402
C2808	T	I8	CHIPCAP X5R 100N K 16V 0402
C2809	T	J6	CHIPCAP X5R 100N K 16V 0402
C2810	T	J6	CHIPCAP X5R 100N K 16V 0402
C2811	T	H8	CHIPCAP X5R 100N K 16V 0402
C2812	T	J8	CHIPCAP X5R 100N K 16V 0402
C2813	T	H6	CHIPCAP X5R 100N K 16V 0402
C2814	T	H7	CHIPCAP X5R 100N K 16V 0402
C2815	T	H8	CHIPCAP X5R 100N K 16V 0402
C2816	T	H6	CHIPCAP X5R 100N K 16V 0402
C2817	T	H8	CHIPCAP X5R 100N K 16V 0402
C2818	T	J6	CHIPCAP X5R 100N K 16V 0402
C2819	T	H8	CHIPCAP X5R 100N K 16V 0402
C2820	T	I8	CHIPCAP X5R 100N K 16V 0402

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Item	Side	XY	Object Name
C2821	T	J7	CHIPCAP X5R 100N K 16V 0402
C2822	T	H6	CHIPCAP X5R 100N K 16V 0402
C2823	T	J8	CHIPCAP X7R 1N0 J 50V 0402
C3100	T	J8	CHIPCAP NP0 27P J 50V 0402
C3300	T	O7	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405
C3302	T	O7	CHIPCAP X5R 1U K 6V3 0603
C3303	T	O8	CHIPCAP X5R 1U K 6V3 0603
C3304	T	M8	CHIPCAP X5R 1U K 6V3 0603
C3305	T	N8	CHIPCAP NP0 27P J 50V 0402
C3307	T	K2	CHIPCAP NP0 27P J 50V 0402
C3308	T	K3	CHIPCAP X5R 22U M 6V3 0805
C3309	T	L2	CHIPCAP X5R 22U M 6V3 0805
C3310	T	K2	CHIPCAP X5R 22U M 6V3 0805
C3311	T	L2	CHIPCAP X5R 22U M 6V3 0805
C3312	T	L3	CHIPCAP X7R 1N0 J 50V 0402
C3350	T	J5	CHIPCAP X5R 1U K 6V3 0402
C3351	T	J7	CHIPCAP X5R 1U K 6V3 0402
C3352			CHIPCAP X5R 1U K 6V3 0402
C3400	T	M4	CHIPCAP X7R 10N K 16V 0402
C3401	T	N4	CHIP ARRAY X5R 2X10N K 16V 0405
C3403	T	M5	CHIPCAP X7R 10N K 16V 0402
C3404	T	N5	CHIPCAP X7R 10N K 16V 0402
C3406	T	O5	CHIPCAP X5R 1U K 6V3 0402
C3407	T	O5	CHIPCAP X7R 10N K 16V 0402
C3410	T	N6	CHIPCAP X7R 10N K 16V 0402
C3411	T	K5	CHIPCAP X7R 10N K 16V 0402
C3412	T	M6	CHIPCAP X7R 10N K 16V 0402
C3415	T	M4	CHIP ARRAY X5R 2X10N K 16V 0405
C3416	T	N4	CHIPCAP X7R 1N8 J 50V 0402
C3417	T	L4	CHIPCAP X5R 10UF 6V3 0603
C3418	T	L4	CHIPCAP X5R 4U7 K 6.3V 0603
C3419	T	K5	CHIPCAP X5R 1U K 6V3 0603
C3420	T	K4	CHIPCAP X7R 10N K 16V 0402
C3421	T	K4	CHIPCAP X5R 4U7 K 6.3V 0603
C3422	T	K4	CHIPCAP X5R 4U7 K 6.3V 0603

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Item	Side	XY	Object Name
C3424	T	N6	CHIPCAP NP0 15P J 50V 0402
C3425	T	N4	CHIPCAP X7R 330P J 50V 0402
C3428	T	N6	CHIPCAP NP0 27P J 50V 0402
C3429	T	N6	CHIPCAP NP0 27P J 50V 0402
C3500	T	Q9	CHIPCAP NP0 1P8 C 50V 0402
C3501	T	N8	CHIPCAP NP0 27P J 50V 0402
C3502	T	N8	CHIPCAP NP0 27P J 50V 0402
C3503	T	O8	CHIPCAP NP0 27P J 50V 0402
C3504	T	O8	CHIPCAP NP0 27P J 50V 0402
C3505	T	P8	CHIPCAP NP0 27P J 50V 0402
C4800	B	F3	CHIPCAP X5R 100N K 16V 0402
C4801	B	E3	CHIPCAP X5R 100N K 16V 0402
C4803	B	E3	CHIPCAP X5R 100N K 16V 0402
C4805	B	E6	CHIPCAP NP0 27P J 50V 0402
C4806	B	E2	CHIPCAP X5R 2U2 K 6V3 0603
C4807	B	F2	CHIPCAP X7R 33N K 10V 0402
C4808	B	E2	CHIPCAP X5R 2U2 K 6V3 0603
C6000	T	P3	CHIPCAP X5R 100N K 16V 0402
C6001	T	P3	CHIPCAP X5R 100N K 16V 0402
C6002	T	N3	CHIPCAP X5R 1U K 6V3 0603
C6003	T	P4	CHIPCAP X5R 1U K 6V3 0603
C6004	T	P4	CHIPCAP X5R 100N K 16V 0402
C6005	T	Q2	CHIPCAP X5R 100N K 16V 0402
C6050	T	M2	CHIPCAP X5R 1U K 6V3 0603
C6051	T	M3	CHIPCAP X5R 1U K 6V3 0603
C6052	T	M3	CHIPCAP NP0 15P J 50V 0402
C7507	T	E7	CHIPCAP X7R 10N K 16V 0402
C7513	T	F8	CHIPCAP X7R 4N7 K 25V 0402
C7518	T	G7	CHIPCAP X5R 100N K 16V 0402
C7519	T	F8	CHIPCAP X5R 1U5 K 4V 0402
C7520	T	F8	CHIPCAP X7R 1N0 J 50V 0402
C7521	T	G4	CHIPCAP NP0 3P3 C 50V 0402
C7523	T	E4	CHIPCAP NP0 3P3 C 50V 0402
C7524	T	G5	CHIPCAP NP0 1P8 C 50V 0402
C7525	T	G5	CHIPCAP NP0 10P J 50V 0402

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Item	Side	XY	Object Name
C7543	T	F3	CHIPCAP X5R 4U7 K 6.3V 0603
C7544	T	F2	CHIPCAP X7R 22N K 16V 0402
C7545	T	F2	CHIPCAP NP0 10P J 50V 0402
C7547	T	F2	CHIPCAP X5R 10UF 6V3 0603
C7548	T	F2	CHIPCAP X7R 8N2 K 16V 0402
C7549	T	F3	CHIPCAP X7R 8N2 K 16V 0402
C7550	T	F2	CHIPCAP X7R 1N0 J 50V 0402
C7553	T	E3	CHIPCAP X7R 1N0 J 50V 0402
C7580	T	G8	CHIPCAP X5R 100N K 16V 0402
C7581	T	G8	CHIPCAP X5R 100N K 16V 0402
C7582	T	G9	CHIPCAP X5R 100N K 16V 0402
C7583	T	G8	CHIPCAP X5R 100N K 16V 0402
C7586	T	G7	CHIPCAP NP0 10P J 50V 0402
C7587	T	F7	CHIPCAP NP0 10P J 50V 0402
C7590	T	E6	CHIPCAP X5R 10UF 6V3 0603
C7591	T	E6	CHIPCAP X5R 10UF 6V3 0603
C7801	T	C2	CHIPCAP NP0 10P J 50V 0402
D3400	T	L5	SDRAM 4MX16 1.8V/1.8V FBGA60 PBFREE
D6000	T	Q3	BTHFM1.0 LMBA48EBR2-080
F2000	B	Q9	SM FUSE F 2.0A 32V 0603
G2200	T	J4	RTC BACKUP CAPAC 311 SIZE FOR 2.6V 4UAH
G7501	T	E8	VCTCXO 38.4MHZ 2.5V 2MA
L2001	T	Q8	FERRITE BEAD 0.6R 600R/100MZ 0402
L2002	T	Q7	CHIP BEAD ARRAY 2X600R 0405
L2003	T	P7	CHIP COIL 68NH J Q12/100MHZ 0603
L2005	T	P7	FERRITE BEAD 0.6R 600R/100MZ 0402
L2101	T	G9	FERR.BEAD 220R/100M 2A 0R05 0603
L2102	T	F9	CHIP COIL 30nH J Q65/500MHz 0805
L2103	T	F9	CHIP COIL 30nH J Q65/500MHz 0805
L2104	T	H9	FERR.BEAD 220R/100M 2A 0R05 0603
L2107	T	H9	FERR.BEAD 220R/100M 2A 0R05 0603
L2110	T	G9	FERR.BEAD 220R/100M 2A 0R05 0603
L2111	T	H9	FERRITE BEAD 0.6R 600R/100MZ 0402
L2170	B	J5	CHIP COIL 30nH J Q65/500MHz 0805
L2171	B	J4	CHIP COIL 30nH J Q65/500MHz 0805

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Item	Side	XY	Object Name
L2172	T	H1	CHIP COIL 33N J Q40/250MHZ 0603
L2173	T	H1	CHIP COIL 33N J Q40/250MHZ 0603
L2202	T	H4	FERR.BEAD 220R/100M 2A 0R05 0603
L2205	T	H4	FERR.BEAD 220R/100M 2A 0R05 0603
L2211	T	N3	FERR.BEAD 220R/100M 2A 0R05 0603
L2212	T	O3	FERR.BEAD 220R/100M 2A 0R05 0603
L2301	T	H3	FERR.BEAD 220R/100M 2A 0R05 0603
L2302	T	H2	INDUCT WW 10U 0A65 0R35 4X4X1.2
L2304	T	H3	CHOKE 22U M 0R7 0.35A 3.0X3.0X1.5
L2400	T	K8	FERRITE BEAD 0.6R 600R/100MZ 0402
L2401	T	L8	FERRITE BEAD 0.6R 600R/100MZ 0402
L2550			COIL 0.47MH 50MA 3.3X3.4X1.4MM
L3300	T	O7	FERR.BEAD 220R/100M 2A 0R05 0603
L3301	T	P7	FERR.BEAD 220R/100M 2A 0R05 0603
L3302	T	M8	FERR.BEAD 220R/100M 2A 0R05 0603
L3303	T	K2	CHOKE 4U7 0.86A 0R2 3X3X1.5
L3350	T	J4	FERR.BEAD 240R/100M 0.4A 0R3 0402
L3351	B	J7	FERR.BEAD 240R/100M 0.4A 0R3 0402
L3352			FERR.BEAD 240R/100M 0.4A 0R3 0402
L3400	T	M4	FERRITE BEAD 220R 0R45 0.3A 0402
L3401	T	M4	FERRITE BEAD 220R 0R45 0.3A 0402
L3402	T	K5	FERR.BEAD 220R/100M 2A 0R05 0603
L3403	T	L4	INDUCT WW 2.2UH 1A2 310 case size
L3404	T	M4	INDUCT WW 2.2UH 1A2 310 case size
L3405	T	N4	CHIP COIL 120NH J Q8/100MHZ 0402
L3500	T	Q8	CHIP COIL 68N J Q17/300MHZ 0402
L7500	T	F7	CHIP COIL 12N J Q31/800MHZ 0402
L7501	T	F7	CHIP COIL 12N J Q31/800MHZ 0402
L7502	T	E7	FERR.BEAD 220R/100M 2A 0R05 0603
L7503	T	G7	FERR.BEAD 240R/100M 0.4A 0R4 0402
L7506	T	E8	FERR.BEAD 240R/100M 0.4A 0R4 0402
L7510	T	E4	FERRITE BEAD 0R01 28R/100MHZ 0603
L7526	T	G6	FERR.BEAD 240R/100M 0.4A 0R4 0402
L7540	T	G3	CHOKE 3U3 1.2A 0R096 3X3X1.5
L7550	T	F2	FERR.BEAD 240R/100M 0.4A 0R4 0402

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Item	Side	XY	Object Name
L7588	T	E7	CHIP COIL 12N J Q31/800MHZ 0402
L7589	T	E7	CHIP COIL 6N8 J Q27/800MHZ 0402
L7590	T	E6	INDUCT ML CHIP PWR 3U3 M 0R15 0.2A
L7591	T	G2	FERRITE BEAD 0R01 28R/100MHZ 0603
L7802	T	C2	CHIP COIL 8N2 G Q80/800MHZ 0603
L7803	T	C2	CHIP COIL 15N +-2% Q40/250MHz 0603
N2000	T	Q8	ST HEADPHONE AMPLIFIER LM4920 uSMD14
N2001	T	P8	IC ANALOG SWITCH SPDT LOW THRESHOLD CSP8
N2101	T	H9	AF AMP TPA2012D2 77DB/217HZ WCSP16
N2160	T	M7	TI ANALOG SWITCH TS5A3159AYZTR WCSP06
N2161	T	M7	TI ANALOG SWITCH TS5A3159AYZTR WCSP06
N2200	T	I5	AVILMA 1.05C BB MODULE TFBGA105
N2300	T	I2	BETTY v2.1 LF TFBGA64
N2301	T	H3	WHITE LED DRIVER 4LEDS 500mW 8bump USMD8
N2550			HALL IC SWITCH SH248CSP VCC
N2551			EL DRIVER D381B 2-7V MSOP-10
N2600	B	F9	IRDA Mir Xsmall
N3300	T	O7	VREG 2.85/150MA(LP3987-2.85)USMD5
N3301	T	K3	DC/DC BOOST CONV. TPS61058 QFN-10
N3401	T	L4	DC/DC CONV LM3671TLX-1.82V
N3402	T	K4	DC/DC CONV TPS62311YZD 1.5V CSP8
N4800	B	E3	LEVEL SHIFTER SINGLE SD/SDIO/MMC CSP25
N4801	B	E2	LI VREG 3.0V/300mA (LP3981YD-3.0) LLP6
N6050	T	M3	VREG 2.85/150MA(LP3987-2.85)USMD5
N7505	T	F8	AHNEUS203A TFBGA144
N7520	T	F5	PW AMP GSM/EDGE850/900/1800/1900 8x8x1.3
N7541	T	G2	DC CONV LM3202TLX NOPB revB µSMD8
N7590	T	E6	DC CONV LM3202TLX NOPB revB µSMD8
R2001	T	O7	CHIPRES 0W06 100K J 0402
R2002	T	P7	CHIP VARISTOR VWM14V VC50V 0402
R2003	T	Q8	CHIP VARISTOR VWM14V VC50V 0402
R2006	T	P8	CHIPRES 0W06 10K J 0402
R2007	B	P3	ASIP SILIC USB OTG / ESD BGA11
R2009	B	P3	CHIPRES 0W06 220K J 0402
R2010	B	O9	ASIP TVS BGA4

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Item	Side	XY	Object Name
R2011	T	O7	CHIPRES 0W06 10K J 0402
R2060	T	I2	ASIP 4XESD *** PB-FREE *** BGA5
R2071	B	O8	NTC RES 0W1 47K +-2% G B 4050 +-2% 0402
R2119	T	F9	VAR.ARRAY 2X16V 824-915MHZ 0405
R2121	T	J9	CHIPRES JUMPER 0R0 0402
R2124	T	J9	CHIPRES JUMPER 0R0 0402
R2151	T	M7	CHIPRES 0W06 10R J 0402
R2152	T	K9	CHIPRES 0W1 2R2 J 0805
R2153	T	K9	CHIPRES 0W1 2R2 J 0805
R2155	T	M7	CHIPRES 0W06 10R J 0402
R2160	T	M7	CHIPRES 0W06 100K J 0402
R2170	B	J4	VAR.ARRAY 2X16V 824-915MHZ 0405
R2200	T	I4	CHIPRES 0W06 2K0 J 0402
R2210	T	K7	CHIPRES 0W06 100R J 0402
R2211	T	K7	CHIP VARISTOR VWM5.6V VC15.5V 040
R2212	T	I4	CHIPRES 0W06 1K0 F 200PPM 0402
R2300	T	J2	CHIPRES 0W01 0R01 J 0603
R2303	T	H3	CHIPRES 0W06 33R J 0402
R2400	T	K8	CHIPRES 0W06 100K J 0402
R2401	T	H4	CHIPRES 0W06 470K J 0402
R2402	T	L8	CHIPRES 0W06 820K J 0402
R2500	T	I7	CHIPRES 0W06 470K J 0402
R2501	T	I7	CHIPRES 0W06 100K J 0402
R2540			NTC RES 0W1 47K J B 4050+-3% 0402
R2550			CHIPRES 0W06 120K J 0402
R2552			CHIPRES JUMPER 0R0 0402
R2553			CHIPRES 0W06 100R J 0402
R2554			CHIPRES 0W06 220K J 0402
R2555			CHIPRES 0W06 220K J 0402
R2556			CHIPRES 0W06 220K J 0402
R2557			CHIPRES 0W06 220K J 0402
R2600	T	E9	CHIPRES 0W125 4R7 J 0805
R2800	T	I6	CHIPRES 0W06 10R J 0402
R2801	T	H7	CHIPRES 0W06 4K7 J 0402
R2802	T	H7	CHIPRES 0W06 4K7 J 0402

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Item	Side	XY	Object Name
R2803	T	J6	CHIPRES 0W06 4K7 J 0402
R2804	T	J8	CHIPRES 0W06 1K0 J 0402
R2900	T	J8	CHIPRES JUMPER 0R0 0402
R2901	T	J8	CHIPRES JUMPER 0R0 0402
R2902	T	J8	CHIPRES JUMPER 0R0 0402
R2903	T	J8	CHIPRES JUMPER 0R0 0402
R2904	T	I8	CHIPRES JUMPER 0R0 0402
R2905	T	I8	CHIPRES JUMPER 0R0 0402
R2906	T	H8	CHIPRES JUMPER 0R0 0402
R2907	T	H8	CHIPRES JUMPER 0R0 0402
R2908	T	J5	CHIPRES JUMPER 0R0 0402
R3300	T	J6	CHIPRES 0W06 100R J 0402
R3301	T	J7	CHIPRES 0W06 100R J 0402
R3303	T	L2	CHIPRES 0W06 39K J 0402
R3304	T	L3	CHIPRES 0W06 56K J 0402
R3305	T	L3	CHIPRES 0W06 27K J 0402
R3308	T	L2	CHIPRES 0W06 22K F 200PPM 0402
R3310	T	L3	CHIPRES 0W06 56K J 0402
R3311	T	L2	RES METFI 0W2 0R75 F 0603
R3312	T	L3	RES METFI 0W2 0R75 F 0603
R3313	T	M2	RES METFI 0W2 0R75 F 0603
R3314	T	M2	RES METFI 0W2 0R75 F 0603
R3315	T	L2	CHIPRES 0W06 27R J 0402
R3320	T	O8	CHIPRES 0W06 1K0 J 0402
R3350	T	G7	CHIPRES JUMPER 0R0 0402
R3353	T	G8	CHIPRES 0W06 10R J 0402
R3354	T	G8	RES NETWORK 0W06 2X10R J 0404
R3355	T	H8	RES NETWORK 0W06 2X10R J 0404
R3356	T	G8	RES NETWORK 0W06 2X10R J 0404
R3357	T	H8	RES NETWORK 0W06 2X10R J 0404
R3401	T	G7	CHIPRES 0W06 10K J 0402
R3405	T	M5	RES NETWORK 0W06 2X4K7 J 0404
R3408	T	N4	CHIPRES 0W06 100R J 0402
R3409	T	N4	CHIPRES 0W06 100R J 0402
R3410	T	N4	RES CARBFI 0W06 2K0 F 200PPM 0402

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Item	Side	XY	Object Name
R3411	T	M6	CHIPRES 0W06 33R J 0402
R3412	T	N6	CHIPRES 0W06 15R J 0402
R3413	T	N6	RES NETWORK 0W06 2X4K7 J 0404
R3417	T	N3	CHIPRES 0W06 33R J 0402
R3418	T	M4	CHIPRES JUMPER 0R0 0402
R3419	T	L3	CHIPRES JUMPER 0R0 0402
R4801	B	D6	CHIPRES 0W06 100R J 0402
R4803	B	D6	CHIP VARISTOR VWM14V VC50V 0402
R4804	B	F2	CHIPRES 0W06 220K J 0402
R4805	B	E2	CHIPRES 0W06 100K J 0402
R6002	T	M2	CHIPRES 0W06 100K J 0402
R6005	B	O8	CHIP COIL 3N9 +-0N3 Q28/800M 0402
R7501	T	F8	CHIPRES 0W06 10R J 0402
R7502	T	G8	CHIPRES 0W06 10K F 0402
R7503	T	G7	CHIPRES 0W06 4K7 J 0402
R7509	T	E8	CHIPRES 0W06 22K J 0402
R7521	T	G5	CHIPRES JUMPER 0R0 0402
R7522	T	F7	CHIPRES 0W06 18K J 0402
R7528	T	E5	CHIPRES 0W06 10R J 0402
R7529	T	E5	CHIPRES 0W06 470R J 0402
R7530	T	E5	CHIPRES 0W06 470R J 0402
R7541	T	G2	CHIPRES 0W06 1K2 F 250PPM 0402
R7543	T	F2	CHIPRES 0W06 10K J 0402
R7544	T	F2	CHIPRES JUMPER 0R0 0402
R7560	T	G3	CHIPRES JUMPER 0R0 0402
R7800	T	D2	CHIPRES JUMPER 0R0 0402
R7801	T	C2	CHIPRES JUMPER 0R0 0402
R7810	T	D3	CHIPRES JUMPER 0R0 0402
S2571			SM DOME SWITCH DC 15 V 20MA
S2572			SM DOME SWITCH DC 15 V 20MA
S2573			SM DOME SWITCH DC 15 V 20MA
S2574			SWITCH TACT 12V 0.05A
T7502	T	E5	TRANSF BALUN 1700-1900MHZ 0603
T7580	T	G6	TRANSF BALUN 2.1 GHZ 1.6X0.8
V2160	T	M7	TR PDTC114EE N50V RB RBE 10K SC75

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Item	Side	XY	Object Name
V2540			SILICON PHOTOTRANS SFH 3710 SMT 2.1x1.4x
V3300	T	L2	MOSFET N 20V 620MA SOT416
V3301	T	M2	MOSFET N 20V 620MA SOT416
V3380			LED WHITE 5000MCD 1000MA 90DEG
X2001	B	Q8	SMD CONN AUD/VID 4POL 30V 2A, 2.5mm DIA
X2002	B	Q3	SMD CONN 5POL MINI-USB B TYPE P0.8
X2070	B	Q2	CONN BATT 3.5V 2A P3.7 H2.7mm
X2170	B	O3	SLP Wire to Board Conn 2pos, P 0.8mm
X2400	T	L7	SM CONN 2X10 F P0.4 PCB/PCB
X2550			SM CONN 2X10 M P0.4 PWB/PWB
X2700	B	E5	SM SIM CONN 6POL P2.54 H1.8
X3300	T	N7	SM CONN 2X10 F P0.4 PCB/PCB
X3350	B	P3	SM FPC CONN 30POL P0.4
X3390	B	P3	SM CONN 2X10 M P0.4 PWB/PWB
X3500	T	M8	CONN COAX 50pin F VERT 100V 0.24A P0.4
X3551	T	B1	CONN COAX 30POL F VERTICAL 50V 0.3A P0.4
X4800	B	E4	SIM TF READER
X7800	T	D3	SM CONN RF JACK 50R 2W 6GHZ
Z2000	T	P8	ASIP AVIF DUAL CHANNEL BGA5
Z2001	B	P4	FERRITE BEAD 0.6R 600R/100MZ 0402
Z2403	T	J9	ASIP 10-CH LCD FILTER W/ESD BGA24
Z2404	T	K7	ASIP 10-CH LCD FILTER W/ESD BGA24
Z2405	T	K7	ASIP 10-CH LCD FILTER W/ESD BGA24
Z2406	T	K7	ASIP 2-Ch MIC EMI/ESD FILT 400UM BGA6
Z4800	B	E3	ASIP MMC HIGH SPEED ESD/EMI FILT BGA16
Z7501	T	F6	DUAL RX SAW FILTER 1800/1900 MHz 2016
Z7504	T	F7	SAW FILT 942.5 +-17.5/2.6 1.4x1.1x0.4mm
Z7521	T	E5	CER FILT LFL181699TC1 2400-2483MHz 1.6
Z7540	T	E3	DUPL 836.5/881.5MHz 3x2.5x1.2
Z7541	T	F3	Duplexer WCDMA BAND1
Z7580	T	G6	SAW FILT RX2100 14x11x06
Z7582	T	E7	SAW FILT 836.5 +-12.5/2.1 /1950 +-30 2.
			RF FRAME CUNI 18ZN20 P2910
			RF LID CUNI 18ZN20 P2910
			BB FRAME CuNi 18Zn20

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Item	Side	XY	Object Name
			BB LID CuNi 18Zn20
			HWA LID CuNi 18Zn20
			HWA FRAME CuNi 18Zn20

Component layouts

Note: See also large scale layouts in the Schematics section.

Main board (1tma)

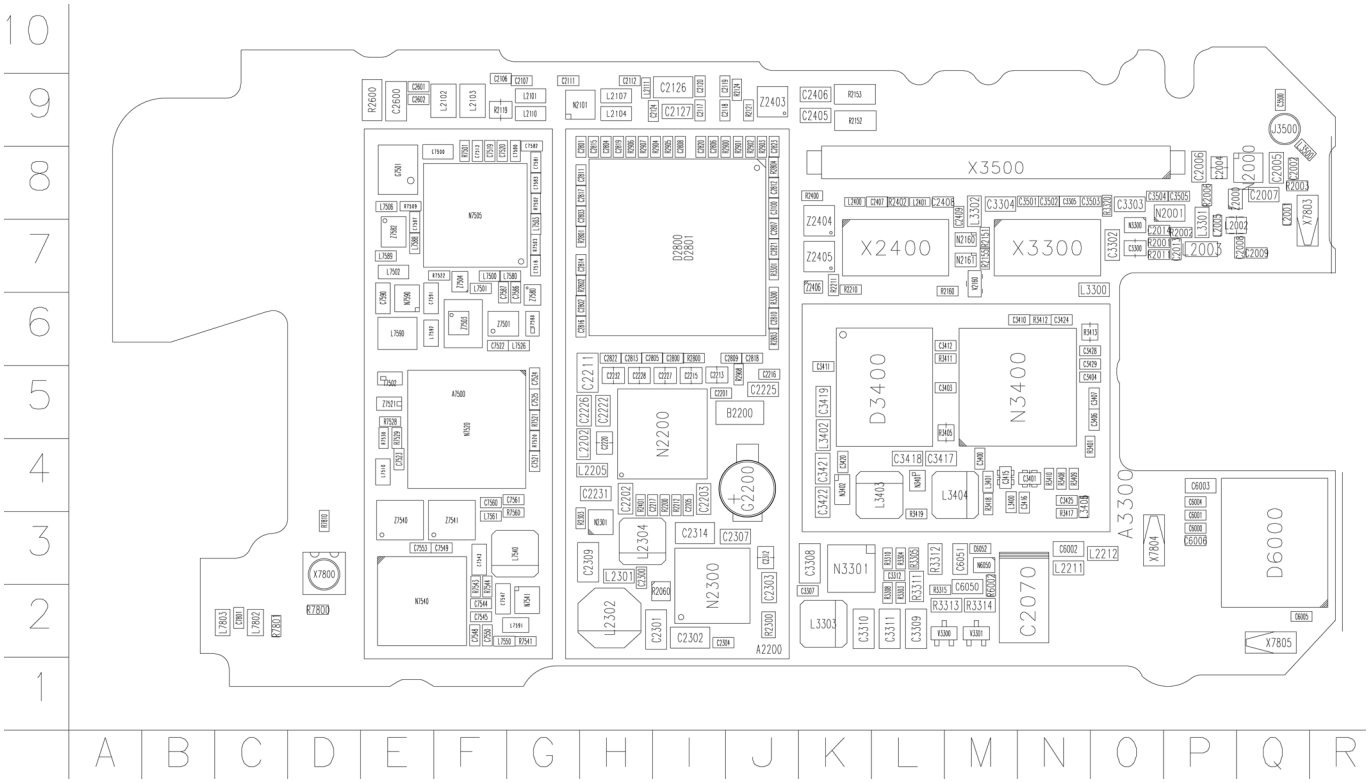

Figure 1 Main board layout, top side (1tma_12a)

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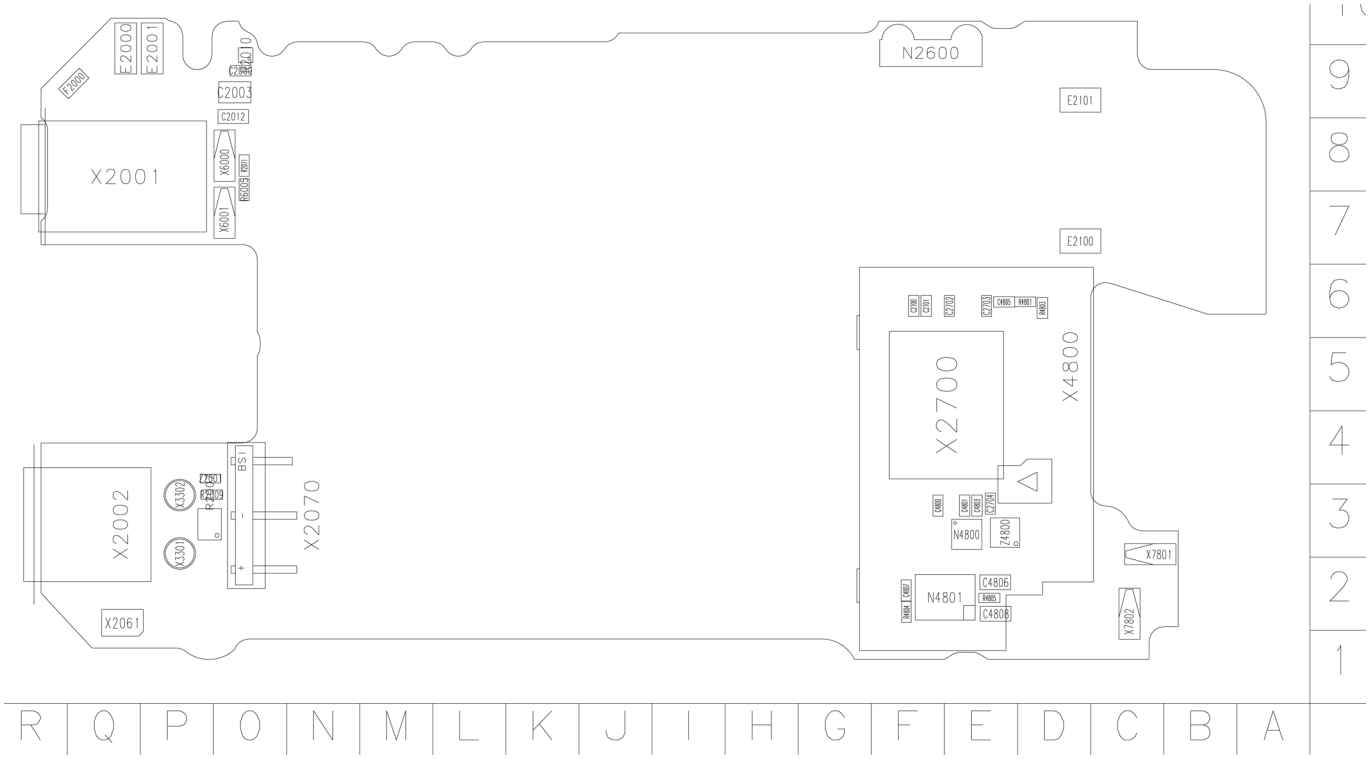

Figure 2 Main board layout, bottom side (1tma_12a)

Top board (1tmb)

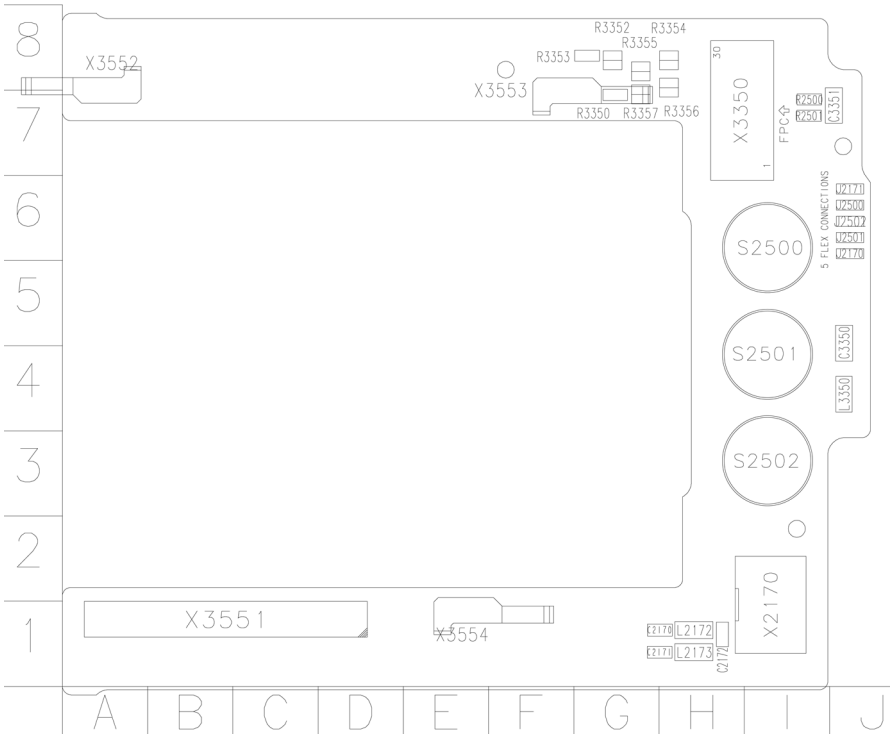

Figure 3 Top board layout, top side (1tmb_04a)

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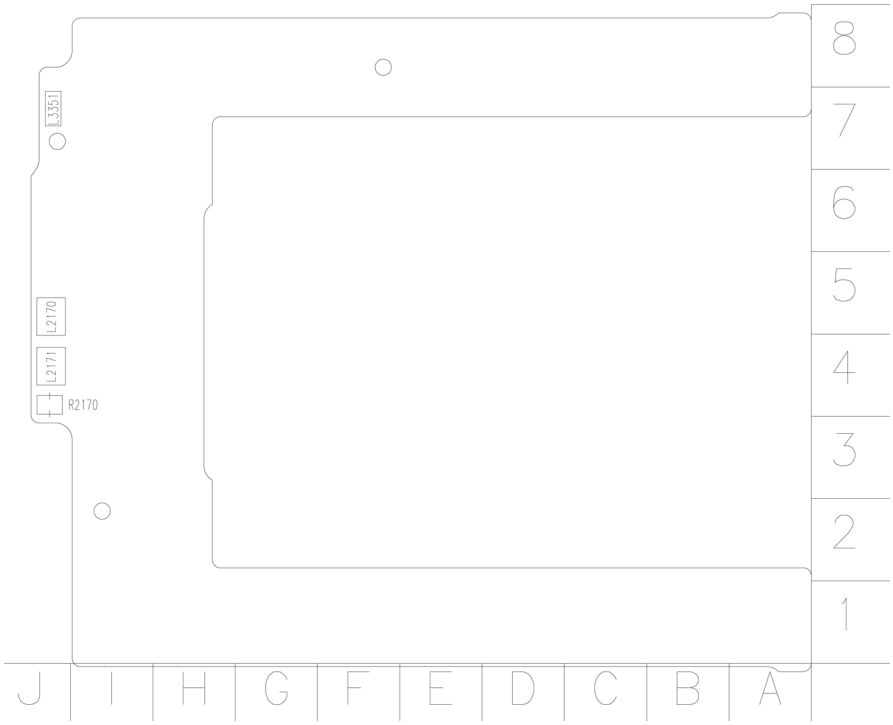

Figure 4 Top board layout, bottom side (1tmb_04a)

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3 — Service Software Instructions

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Phoenix installation steps in brief

Prerequisites

Recommended hardware requirements:

- Computer processor: Pentium 700 MHz or higher
- RAM 256 MB
- Disk space 100-300 MB

Supported operating systems:

- *Windows 2000* Service Pack 3 or higher
- *Windows XP* Service Pack 1 or higher

Context

Phoenix is a service software for reprogramming, testing and tuning phones.

Phoenix installation contains:

- Service software support for all phone models included in the package
- Flash update package files for programming devices
- All needed drivers for:
  - PKD-1 (DK2) dongle
  - DKU-2 USB cable

    Note: Separate installation packages for flash update files and drivers are also available, but it is not necessary to use them unless there are updates between *Phoenix* service software releases. If separate update packages are used, they should be used after *Phoenix* and data packages have been installed.

The phone model specific data package includes all changing product specific data:

- Product software binary files
- Files for type label printing
- Validation file for the faultlog repair data reporting system
- All product specific configuration files for *Phoenix* software components

  Note: *Phoenix* and phone data packages should only be used as complete installation packages. Uninstallation should be made from the *Windows* Control Panel.

To use *Phoenix*, you need to:

Steps

1. Connect a PKD-1 (DK2) dongle to the computer parallel port.
2. Install *Phoenix*.
3. Install the phone-specific data package.
4. Configure users.
5. Manage connection settings (depends on the tools you are using).

If you use FPS-8:	• Update FPS-8 software • Activate FPS-8

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If you use FPS-10:	• Update FPS-10 software **Note:** There is no need to activate FPS-10. • Activate SX-4 smart card, if you need tuning and testing functions. **Note:** When FPS-10 is used only for product software updates, SX-4 smart card is not needed.

Results

Phoenix is ready to be used with FPS-8 or FPS-10 flash prommers and other service tools.

Installing *Phoenix*

Prerequisites

- Check that a dongle is attached to the parallel port of your computer.
- Download the *Phoenix* installation package (for example, *phoenix_service_sw_2004_39_x_xx.exe*) to your computer (in *C:|TEMP*, for instance).
- Close all other programs.
- Depending on your operating system, administrator rights may be required to install *Phoenix*.
- If uninstalling or rebooting is needed at any point, you will be prompted by the InstallShield program.

Context

At some point during the installation procedure, you may get the following message:

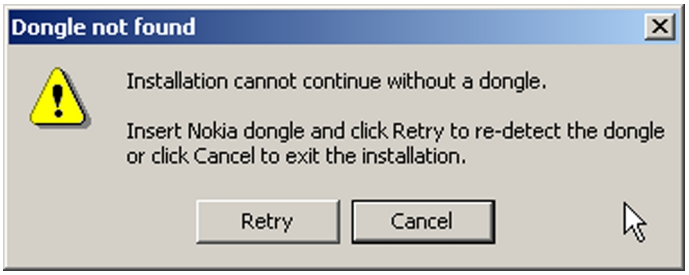

Figure 5 Dongle not found

This may be a result of a defective or too old PKD-1 dongle.

Check the COM/parallel ports used. After correcting the problem, you can restart the installation.

For more detailed information, please refer to *Phoenix* Help files.

Tip: Each feature in *Phoenix* has its own Help function, which can be activated while running the program. Press the **F1** key or the feature's **Help** button to activate a Help file.

Steps

1. To start the installation, run the application file (for example,*phoenix_service_sw_2004_39_x_xx.exe*).
2. In the *Welcome* dialogue, click **Next**.

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3. Read the disclaimer text carefully and click **Yes**.

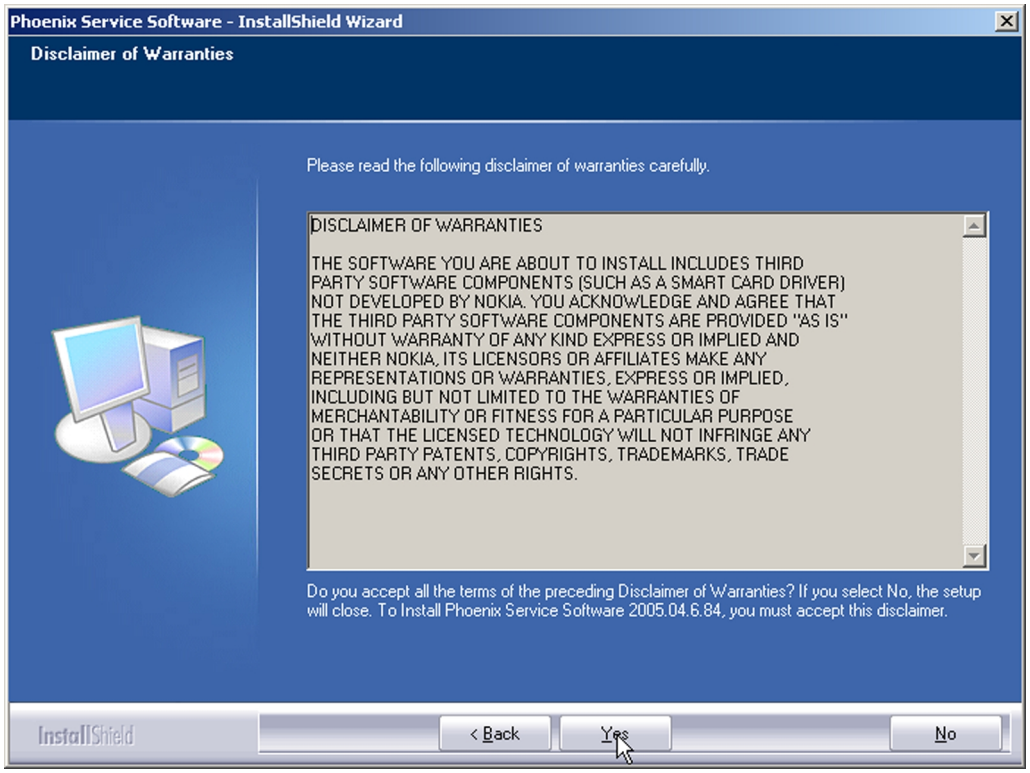

Figure 6 Disclaimer text

4. Choose the destination folder.
   The default folder *C:|ProgramFiles|Nokia|Phoenix* is recommended.
5. To continue, click **Next.**
   To choose another location, click **Browse** (not recommended).
6. Wait for the components to be copied.
   The progress of the installation is shown in the *Setup Status* window.
7. Wait for the drivers to be installed and updated.
   The process may take several minutes to complete.
   If the operating system does not require rebooting, the PC components are registered right away.
   If the operating system requires restarting your computer, the Install Shield Wizard will notifies about it.
   Select **Yes...** to reboot the PC immediately or **No...** to reboot the PC manually afterwards.
   After the reboot, all components are registered.

   Note: *Phoenix* does not work, if the components have not been registered.

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8. To end the installation, click **Finish**.

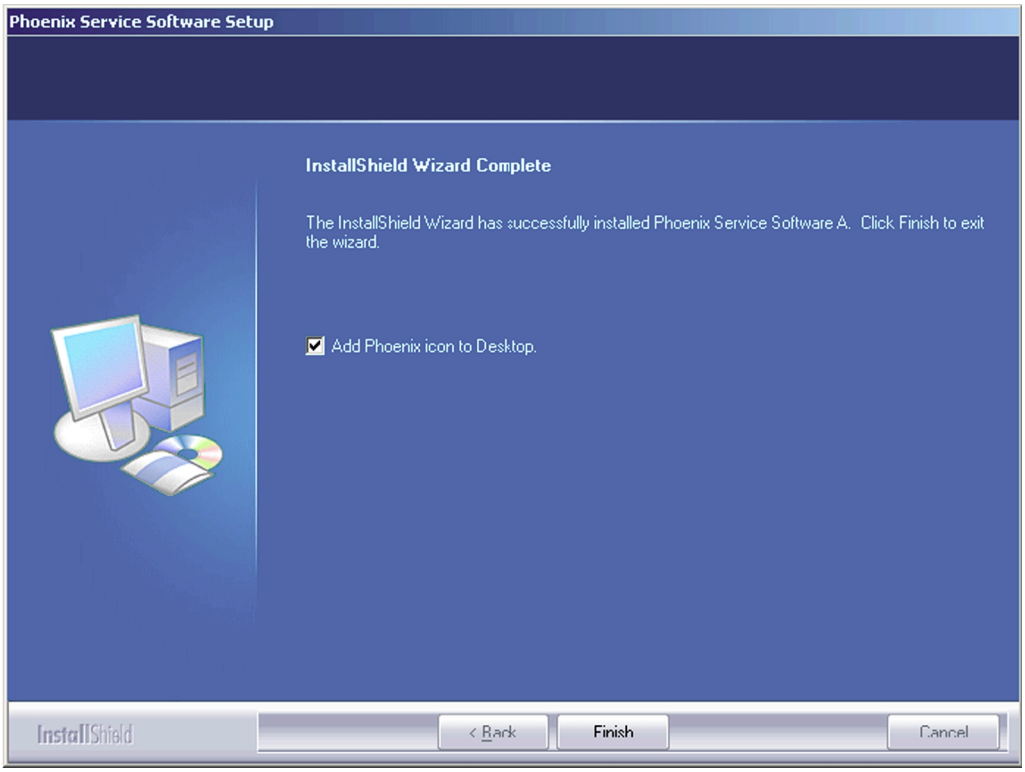

Figure 7 InstallShield Wizard Complete

Next actions

After the installation, *Phoenix* can be used after:

- installing phone model specific data package for *Phoenix*
- configuring users and connections

FPS-8 and FPS-10 flash prommers can be used after updating their flash update package files.

Updating *Phoenix* installation

Context

- If you already have the *Phoenix* service software installed on your computer, you need to update the software when new versions are released.
- To update *Phoenix*, you need to follow the same steps as when installing it for the first time.
- When you are updating, for example, from version **a14_2004_16_4_47** to **a15_2004_24_7_55**, the update will take place automatically without uninstallation.
- Always use the latest available versions of both *Phoenix* and the phone-specific data package. Instructions can be found in the phone model specific Technical Bulletins and phone data package *readme.txt* files (shown during installation).
- If you try to update *Phoenix* with the same version you already have (for example, **a15_2004_24_7_55** to **a15_2004_24_7_55**), you are asked if you want to uninstall the existing version. In this case you can choose between a total uninstallation or a repair installation in a similar way when choosing to uninstall the application from the *Windows* Control Panel.
- If you try to install an older version (for example, downgrade from **a15_2004_24_7_55** to **a14_2004_16_4_47**), installation will be interrupted.

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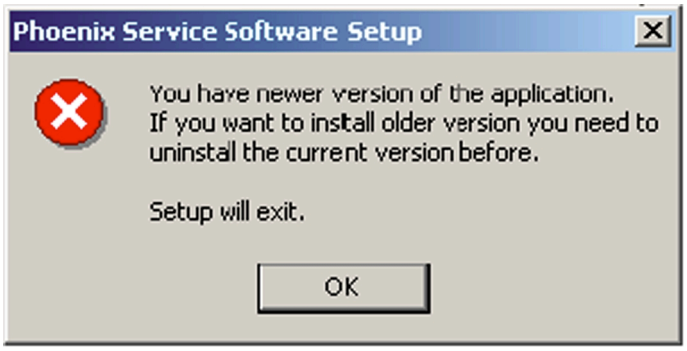

Figure 8 Installation interrupted

- Always follow the instructions on the screen.

Steps

1. Download the installation package to your computer hard disk.
2. Close all other programs.
3. Run the application file (for example, *phoenix_service_sw_2004_39_x_xx.exe*).

Results

A new *Phoenix* version is installed and driver versions are checked and updated.

Uninstalling *Phoenix*

Context

You can uninstall *Phoenix* service software manually from the *Windows* Control Panel.

Steps

1. Open the **Windows Control Panel**, and choose **Add/Remove Programs**.

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2. To uninstall *Phoenix*, choose **Phoenix Service Software→Change/Remove→Remove** .

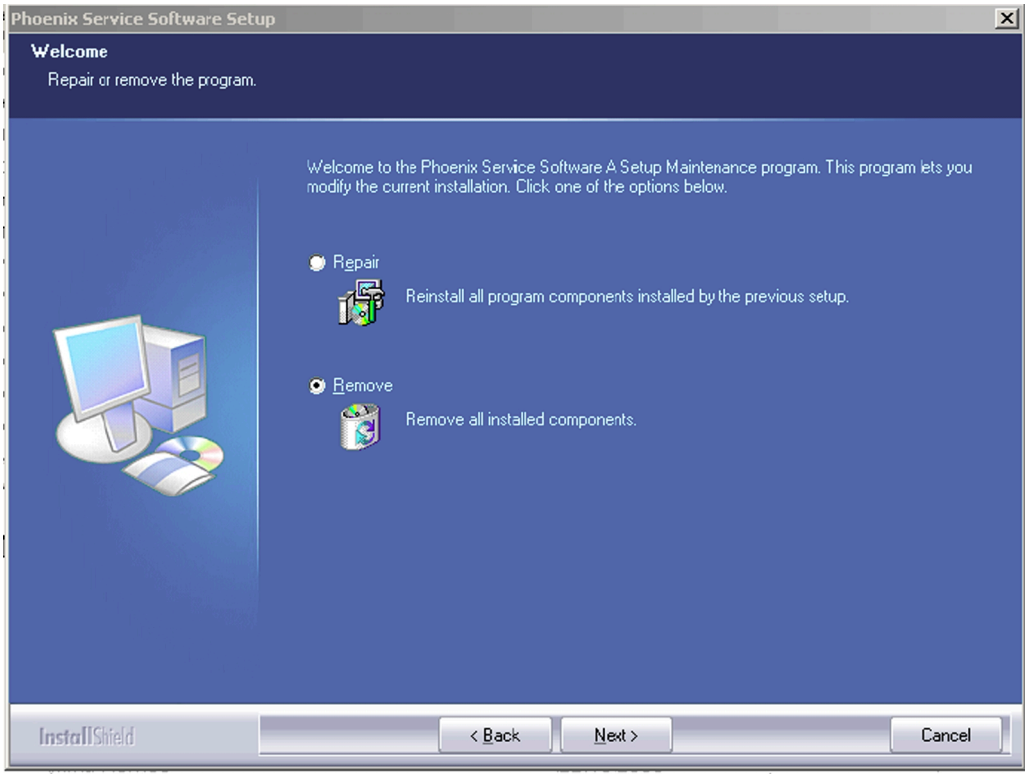

Figure 9 Remove program

The progress of the uninstallation is shown.

3. If the operating system does not require rebooting, click **Finish** to complete.

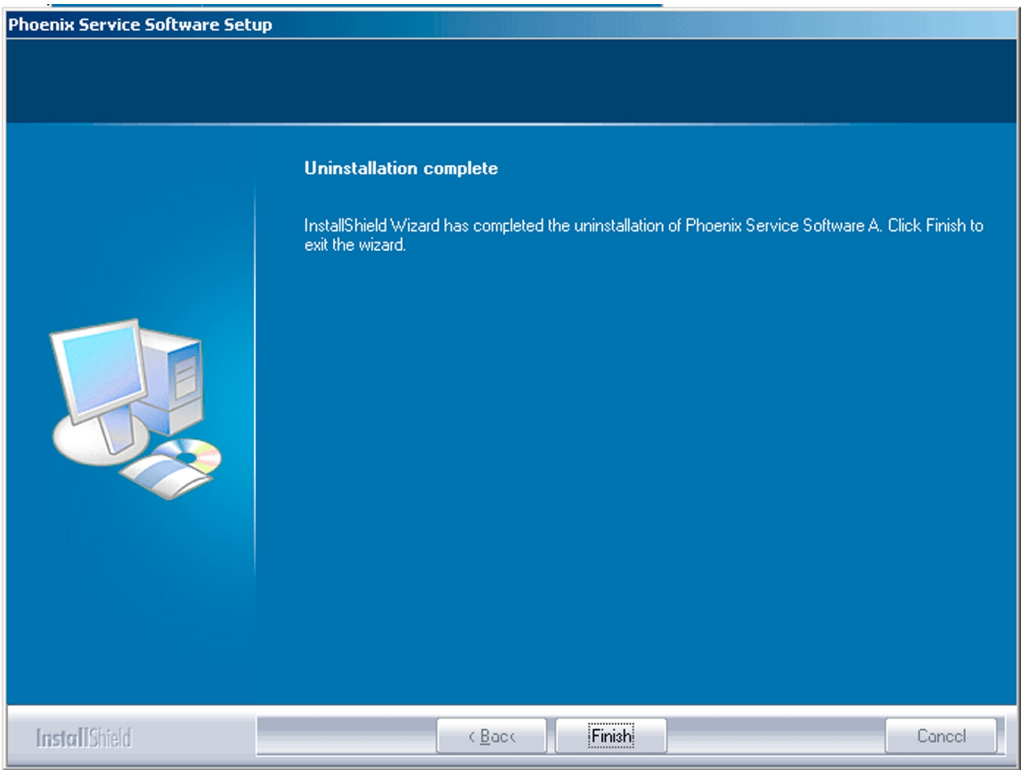

Figure 10 Finish uninstallation

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If the operating system requires rebooting, InstallShield Wizard will notify you. Select **Yes...** to reboot the PC immediately and **No...** to reboot the PC manually afterwards.

Repairing *Phoenix* installation

Context

If you experience any problems with the service software or suspect that files have been lost, use the repair function before completely reinstalling *Phoenix*.

Note: The original installation package (for example, *phoenix_service_sw_a15_2004_24_7_55.exe*) must be found on your PC when you run the repair setup.

Steps

1. Open **Windows Control Panel→Add/Remove Programs** .
2. Choose **Phoenix Service Software→Change/Remove** .
3. In the following view, select **Repair**.

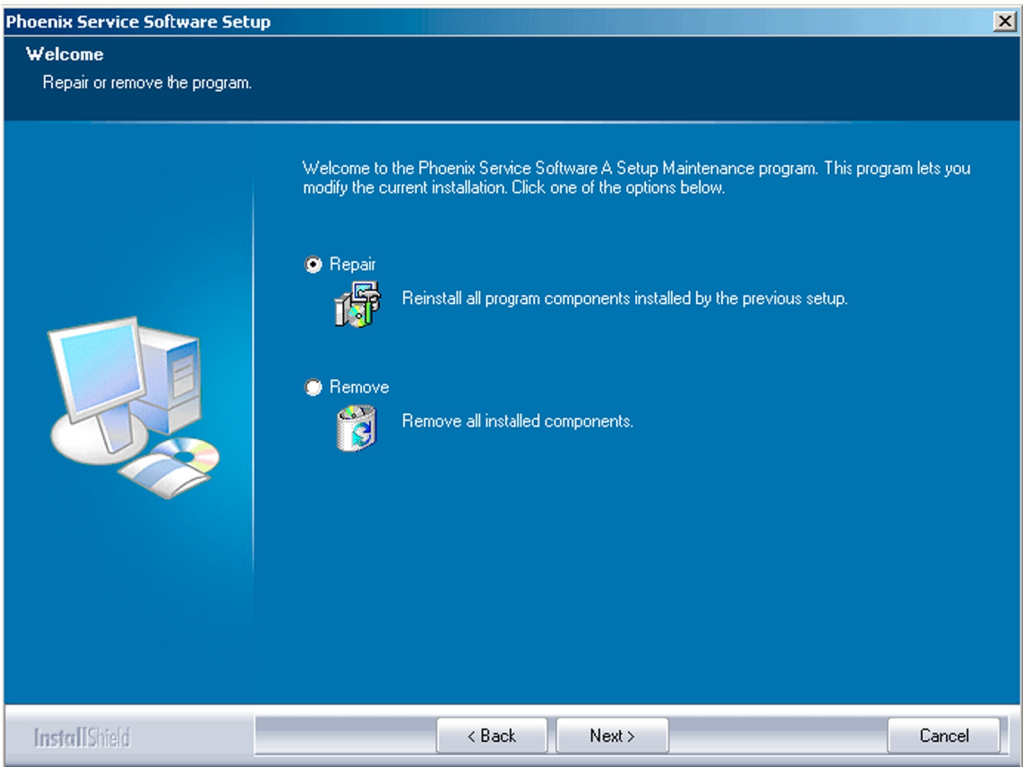

Figure 11 Repair program

Phoenix reinstalls components and registers them.

The procedure is the same as when updating *Phoenix*.

4. To complete the repair, click **Finish**.

Phone data package overview

Each product has its own data package (DP). The product data package contains all product-specific data files to make the Phoenix service software and tools usable with a certain phone model.

The phone data package contains the following:

- Product software binary files

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- Files for type label printing
- Validation file for the fault log repair data reporting system
- All product-specific configuration files for Phoenix software components

Data files are stored in **C:\Program Files\Nokia\Phoenix** (default).

Installing phone data package

Prerequisites

- A phone-specific data package contains all data required for the *Phoenix* service software and service tools to be used with a certain phone model.
- Check that a dongle is attached to the parallel port of your computer.
- Install *Phoenix* service software.
- Download the installation package (for example, *XX-XX_dp_EA_v_1_0.exe*) to your computer (for example, in C:\TEMP).
- Close all other programs.

(XX-XX = type designator of the product)

If you already have *Phoenix* installed on your computer, you will need to update it when a new version is released.

> **Note:** Often *Phoenix* and the phone-specific data package come in pairs, meaning that a certain version of *Phoenix* can only be used with a certain version of a data package. Always use the latest available versions of both. Instructions can be found in phone-specific Technical Bulletins and *readme.txt* files of data packages.

Steps

1. To start the installation, run the application file (for example, *XX-XX_dp_EA_ v_1_0.exe*),

   Wait for the installation files to be extracted.

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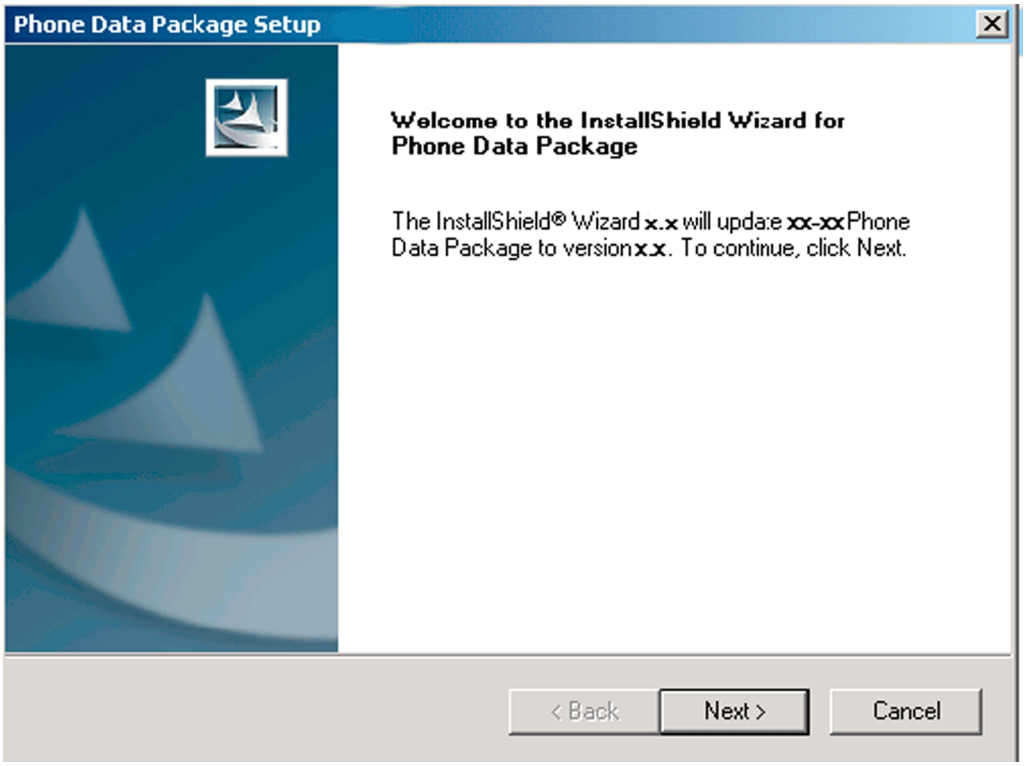
2. Click **Next**.



3. In the following view you can see the contents of the data package. Read the text carefully. There is information about the *Phoenix* version required with this data package.

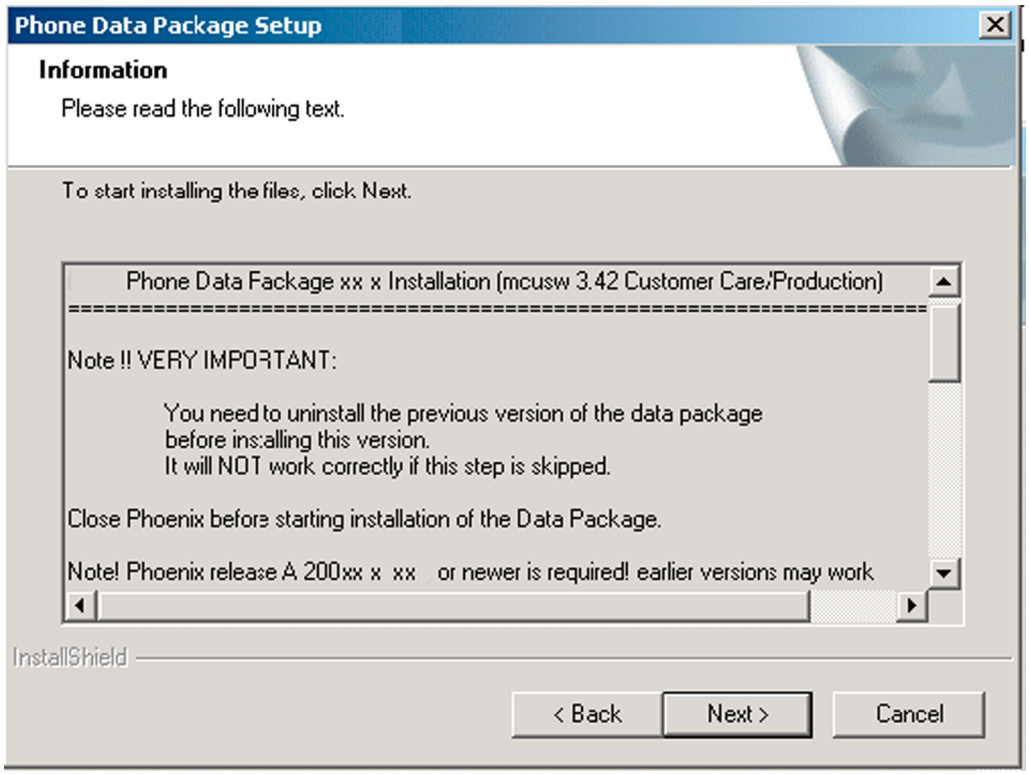


Figure 12 Data package setup information

4. To continue, click **Next**.

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5. Choose the destination folder, and click **Next** to continue.

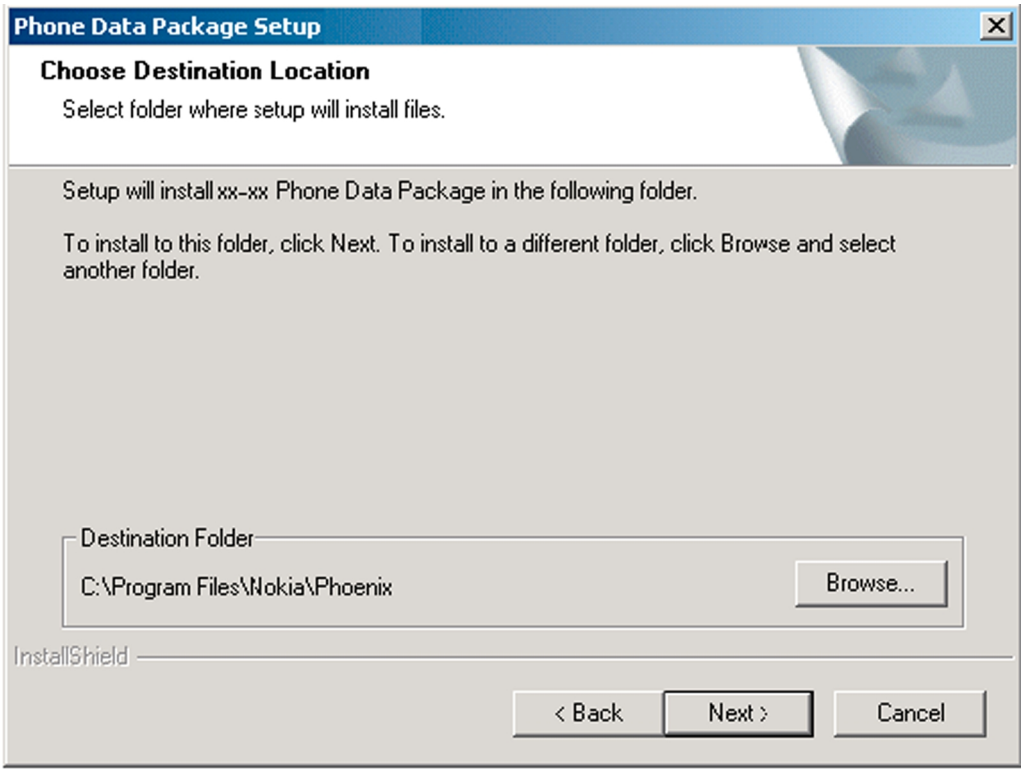
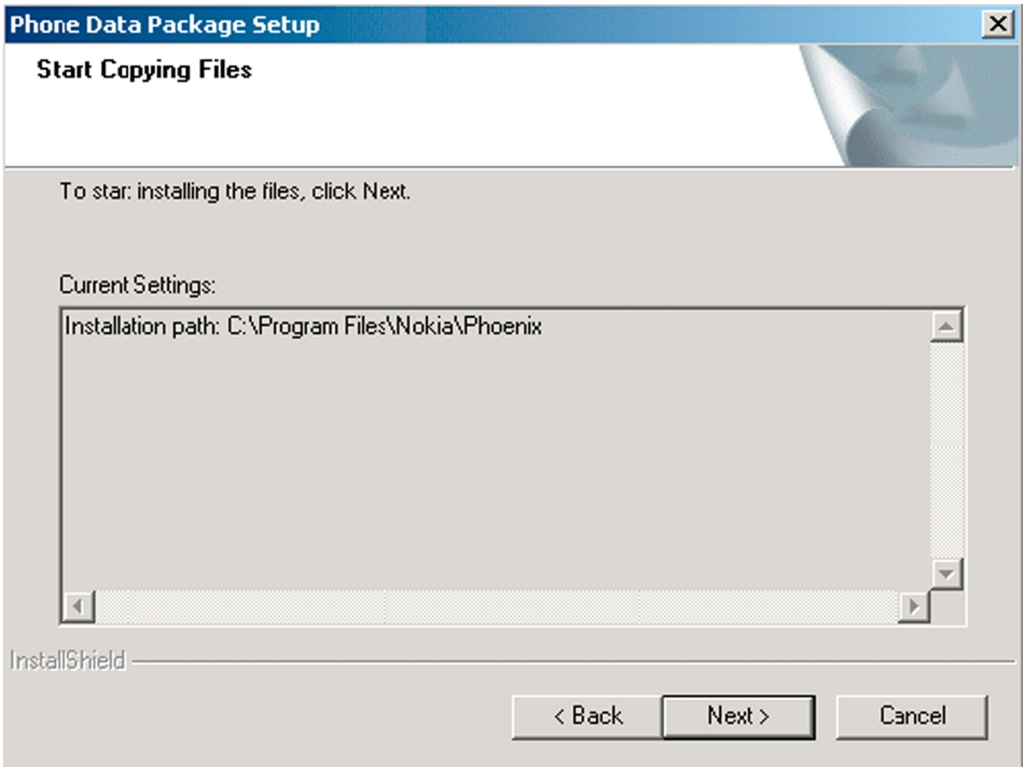


Figure 13 Data package destination folder

The InstallShield Wizard checks where *Phoenix* is installed, and the directory is shown.

6. To start copying the files, click **Next**.



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Phone model specific files are installed. Please wait.

7. To complete the installation, click **Finish**.

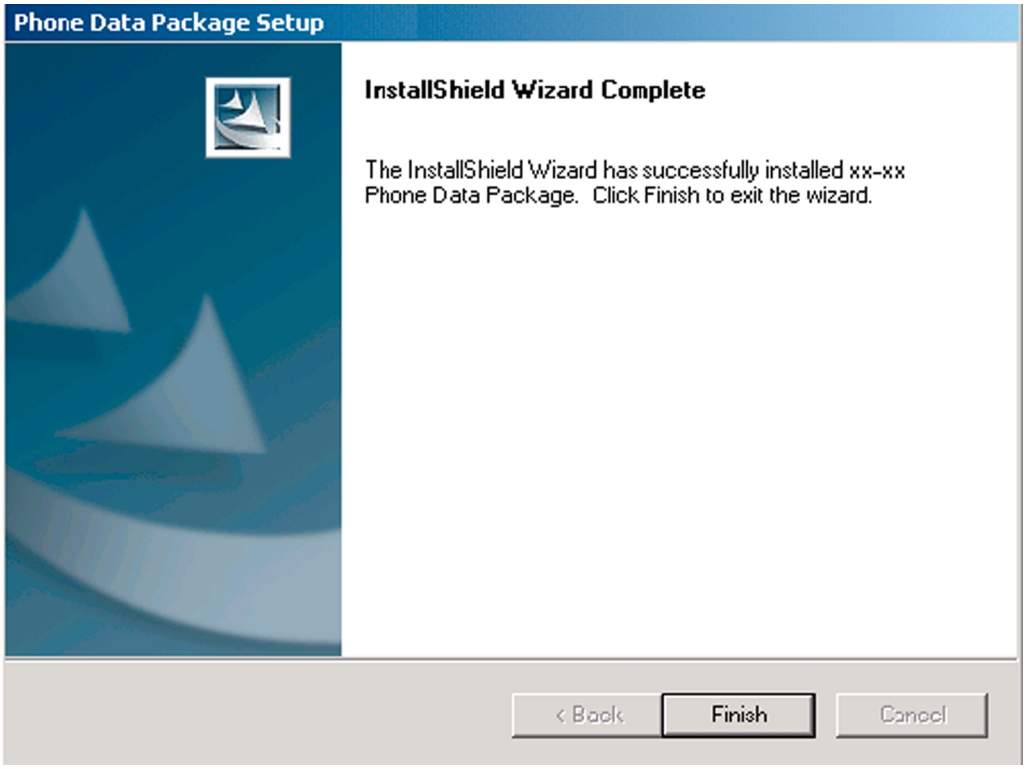

Figure 14 InstallShield Wizard Complete

Next actions

Phoenix can be used for flashing phones and printing type labels after:

- Configuring users
- Managing connections

FPS-8 and FPS-10 can be used after updating their flash update package files.

Uninstalling phone data package

Context

There is no need to uninstall an older version of a data package, unless instructions to do so are given in the *readme.txt* file of the data package and bulletins related to the release.

Please read all related documents carefully.

Steps

1. Locate the data package installation file (e.g. *XX-XX_dp_EA_v_1_0.exe*) from your computer.
2. To start the uninstallation procedure, double-click the data package installation file.

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3. To uninstall the data package, click **OK** or to interrupt the uninstallation, click **Cancel**.

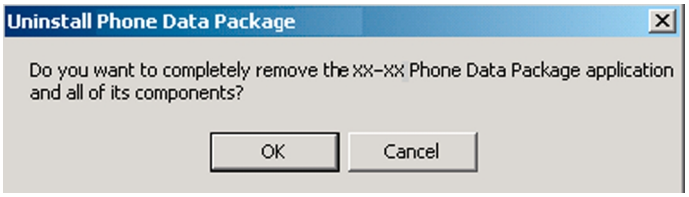

Figure 15 Uninstalling phone data package

4. When the data package is uninstalled, click **Finish**.

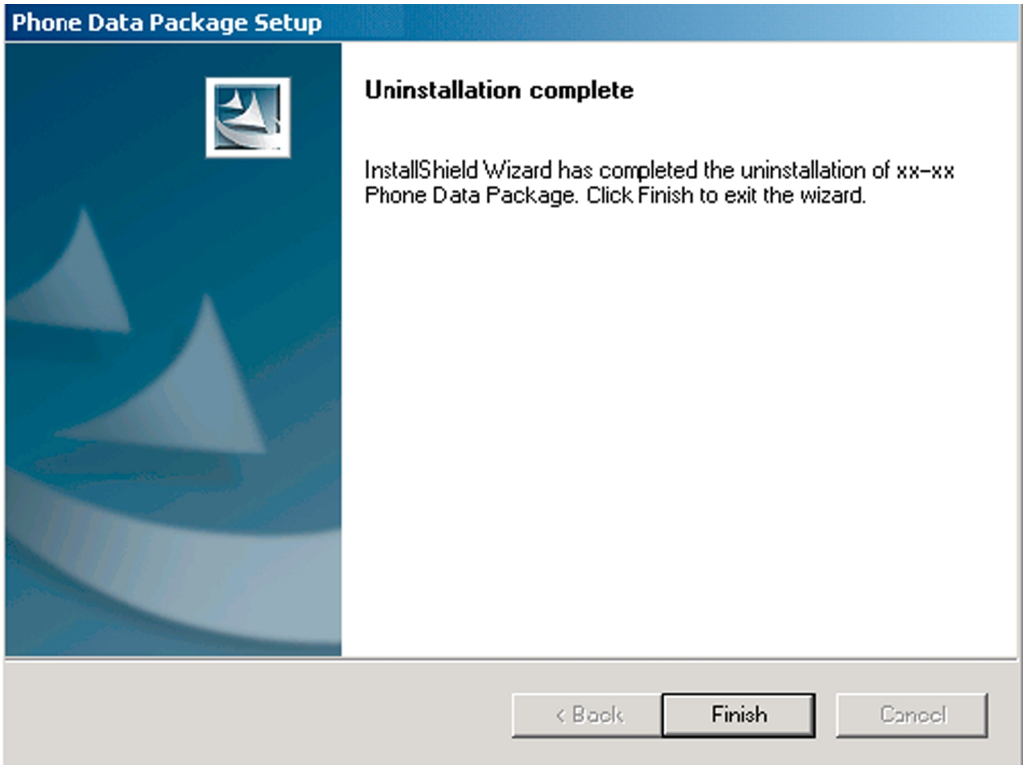

Figure 16 Finishing data package uninstallation

Alternative steps

- You can also uninstall the data package manually from **Control Panel→Add/Remove Programs→xx-xx* Phone Data Package** . (*= type designator of the phone).

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Configuring users in *Phoenix*

Steps

1. Start *Phoenix* service software, and log in.

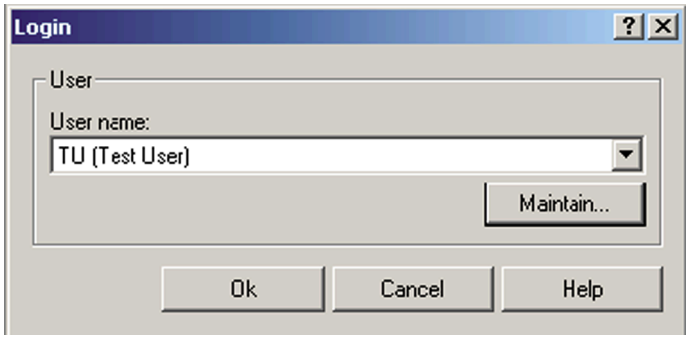

Figure 17 Phoenix login

   If the user ID is already configured, select s/he from the *User name* drop-down list, and click **OK**.
2. To add a new user, or to edit existing ones, click **Maintain**.
3. To add a new user, click **New**.
4. Type in the name and initials of the user, and click **OK**.
   The user is added to the user name list.
5. Select the desired user from the *User name* drop-down list, and click **OK**.

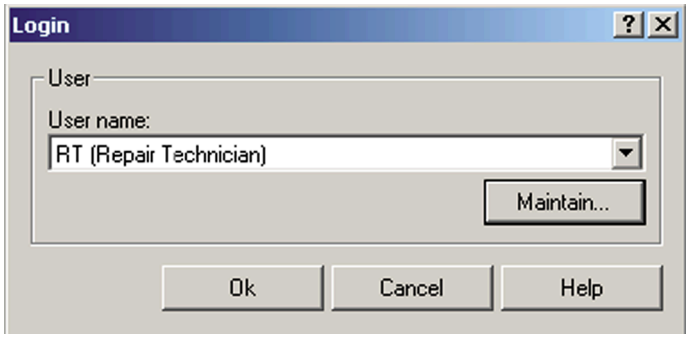

Figure 18 New user configured

Managing connections in *Phoenix*

Context

With the **Manage Connections** feature you can edit and delete existing connections or create new ones.

> **Note:** After choosing the desired connection, and connecting the phone to a PC for the first time, allow the PC to install the USB device drivers first. Please note that this may take some time to complete.
>
> If there are problems after the driver installation, check that the USB connection is active from the **Windows Control Panel**. If the problem persists, contact the local PC support.

Steps

1. Start *Phoenix*, and log in.
2. Choose **File→Manage Connections...** .

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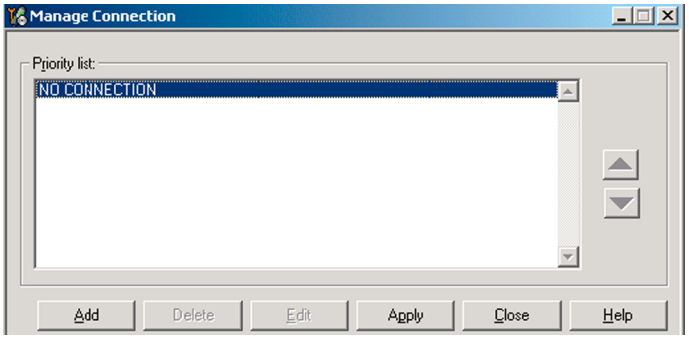
3. To add a new connection, click **Add**.



4. Select **Manual** mode, and click **Next** to continue.

   If you want to create the connection using the Connection Wizard, connect the tools and a phone to your PC. The wizard will automatically try to configure the correct connection.

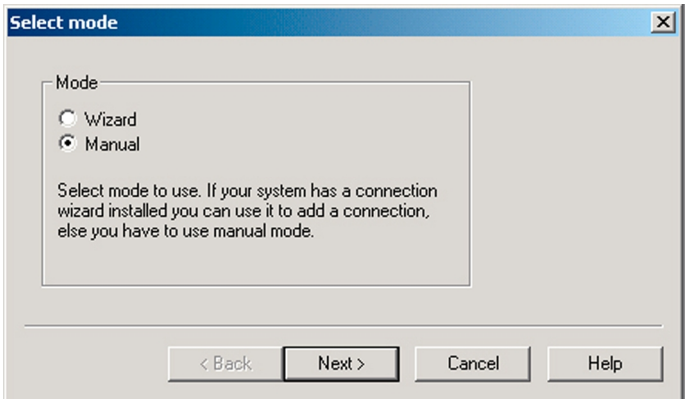


Figure 19 Select mode: Manual

i For an FPS-10 flash prommer with a **USB Connection**, choose the following connection settings:
   - Media: **FPS-10 USB**
   - DEVICE_INDEX: **0**
   - SERIAL_NUM: See Serial No from the label attached to the bottom of FPS-10
   - ACTIVE_MEDIA: **USB**

ii For an FPS-10 flash prommer with a **LAN connection**, choose the following connection settings:
   - Media: **FPS-10 TCP/IP**
   - NET_SERV_NAME: Click **Scan...**. Choose your own FPS-10 device based on the correct MAC address. See Serial No from the label attached to the bottom of your FPS-10.
   - PORT_NUM: Use the default value, and click **Next**.
   - PROTOCOL_FAMILY: Use the default value, and click **Next**.
   - SOCKET TYPE: Use the default value, and click **Next**.
   - TX_BUFFER_SIZE: Use the default value, and click **Next**.
   - RX_BUFFER_SIZE: Use the default value, and click **Next**.

iii For an FPS-8 flash prommer, choose the following connection settings:
   - Media: FPS-8
   - PORT_NUM: COM Port where FPS-8 is connected
   - COMBOX_DEF_MEDIA: **FBUS**

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iv For a plain **USB connection**, choose the following connection settings:

Note: First connect the DKU-2 USB cable between the PC USB port and phone.

- Media: USB

5. To complete the configuration, click **Finish**.
6. Click the connection you want to activate. Use the up/down arrows located on the right hand side to move it on top of the list, then click **Apply**.

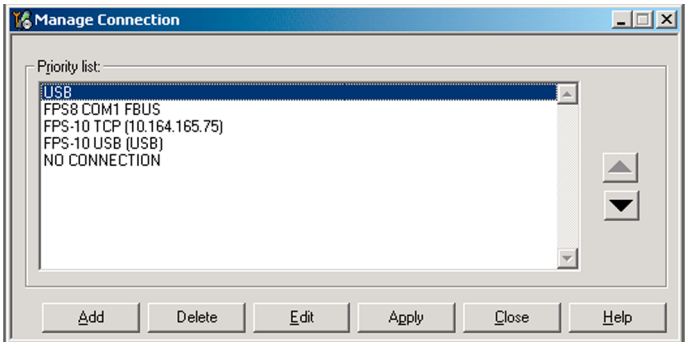

Figure 20 Connections list

The connection is activated, and it can be used after closing the *Manage Connection* window.

The connection information is shown at the right hand bottom corner of the screen.

Figure 21 Connection information

7. To use the connection, connect the phone to your PC with correct service tools. Make sure the phone is switched on, and then choose **File→Scan Product** .

Results

The product support module information appears in the status bar:

Figure 22 Product support module information (example from RM-1)

Installing flash support files for FPS-8 and FPS-10

Prerequisites

- Install *Phoenix* service software.
- Install phone model specific data package for *Phoenix*.
- If you want to update the flash support files, they are delivered in the same installation package with *Phoenix* or newer *Phoenix* packages beginning from December 2004.

  In case you want to update the MCU files, install the latest data package (see Technical Bulletins for information on the latest one).

  Normally, it is enough to install *Phoenix* and the phone-specific data package because the installation always includes the latest flash update package files for FPS-8 and FPS-10.
- A separate installation package for flash support files is available. The files can be updated according to these instructions, if updates appear between *Phoenix* data package releases.

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Context

If you are not using a separate installation package, you can skip this section and continue with "Updating FPS-8 and FPS-10 flash prommer software" (page 3–22) after installing a new phone data package.

Steps

1. To begin the installation, double-click the flash update file (for example, *flash_update_03_183_0014.exe*).

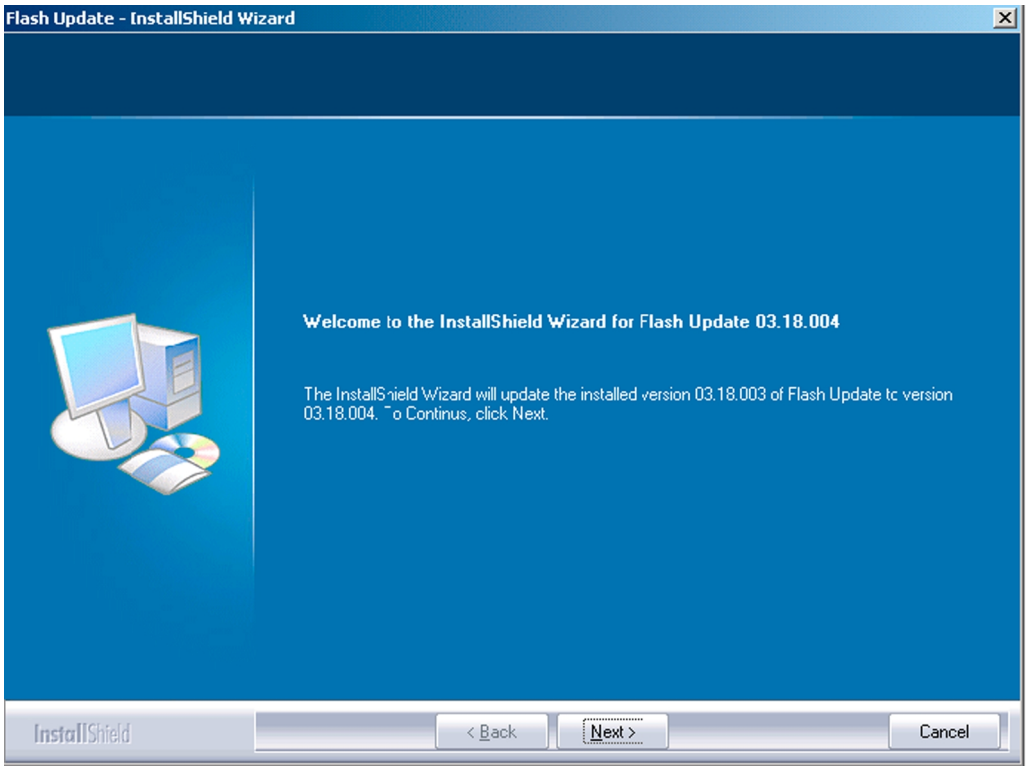

Figure 23 Flash update welcome dialog

If the same version of the flash update package already exists, and you want to reinstall it, the previous package is first uninstalled.

Restart installation again after the uninstallation.

2. If you try to downgrade the existing version to older ones, the setup will be aborted. If there is a need to downgrade the version, uninstall newer files manually from the **Windows Control Panel**, and then rerun the installation.

Figure 24 Flash installation interrupted

If an older version exists on your PC and it needs to be updated, click **Next** to continue installation.

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3. It is recommended to install the files to the default destination folder *C:|Program Files|Nokia|Phoenix*. To continue, click **Next**.

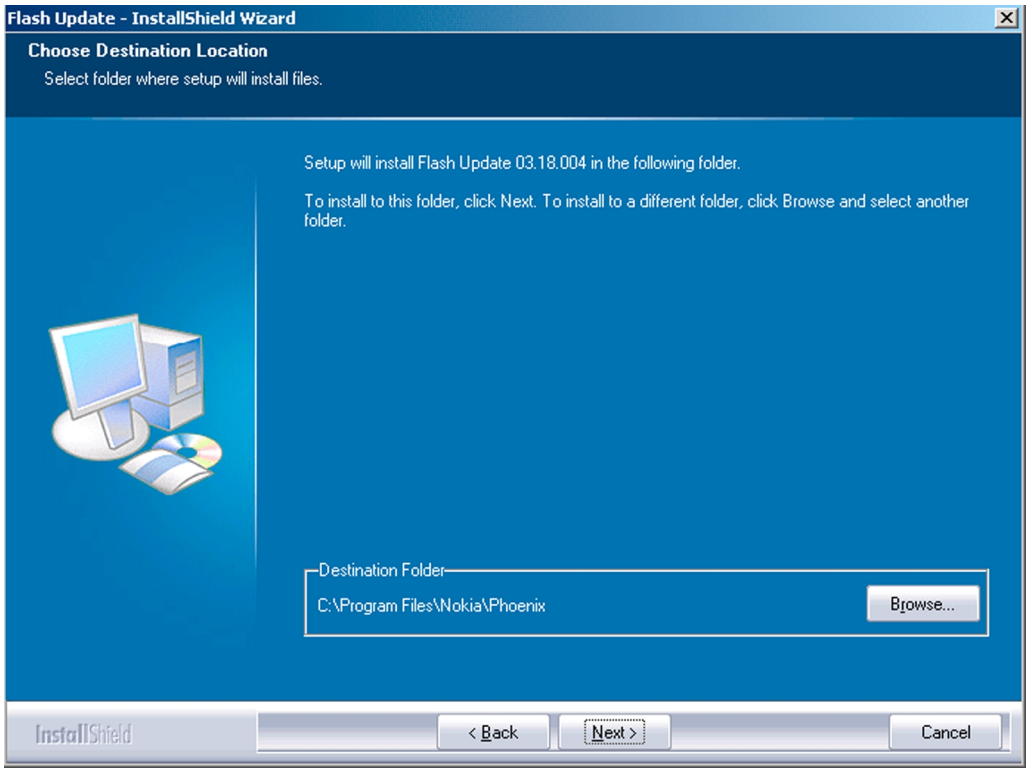

Figure 25 Flash destination folder

When installing the flash update files for the first time, you may choose another location by selecting **Browse** (not recommended).

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4. To complete the installation procedure, click **Finish** .

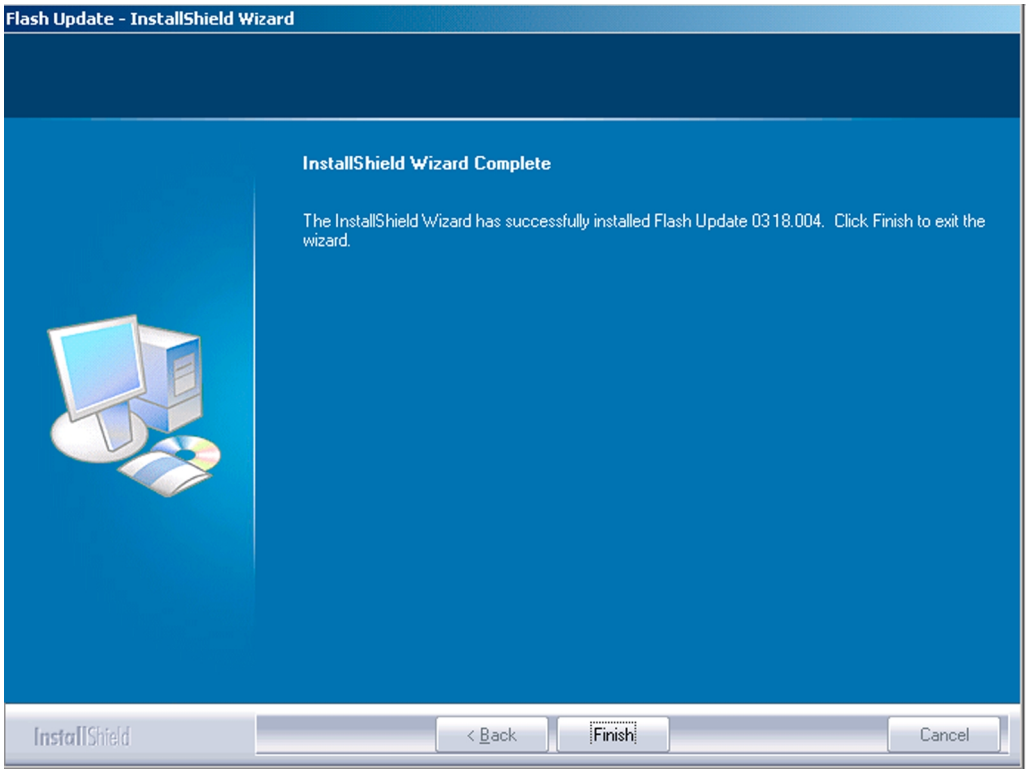

Figure 26 Finish flash update

Next actions

FPS-8 and FPS-10 flash prommers must be updated using *Phoenix*.

Updating FPS-8 and FPS-10 flash prommer software

Steps

1. Start *Phoenix* service software, and log in.
2. Choose the correct connection for your flash prommer: **File→Manage Connections...**
3. Choose **Flashing→Prommer maintenance** .
4. To update the **FPS-8/FPS-10** software, click **Update**, and select the appropriate file *fps8upd.ini* (for FPS-8) or *fpsxupd.ini* (for FPS-10) from *C:|Program Files|Nokia|Phoenix|Flash*.

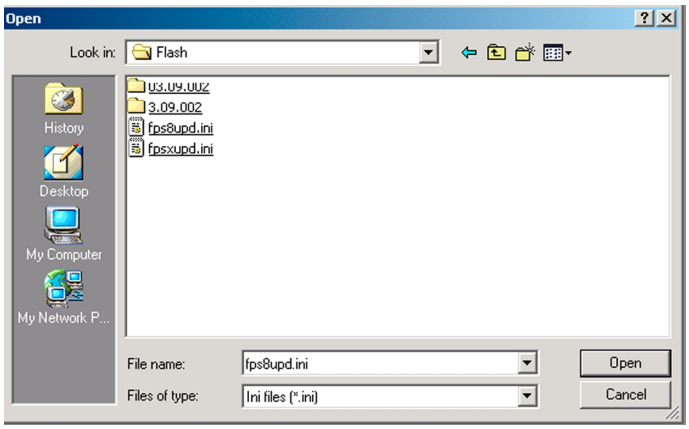

Figure 27 Flash directory window

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Tip: All files can be loaded separately to the prommer used. To do this, click the right mouse button in the *Flash Box Files* pane and select the file type(s) to be loaded.

5. Click **OK**.

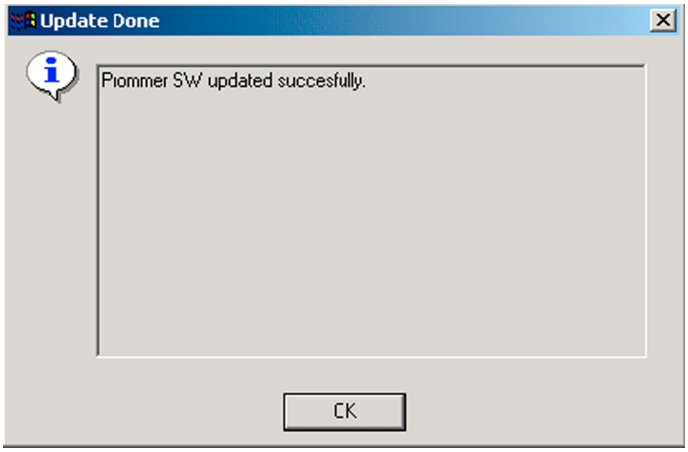

Figure 28 Prommer software update finished

6. To close the *Prommer Maintenance* window, click **Close**.

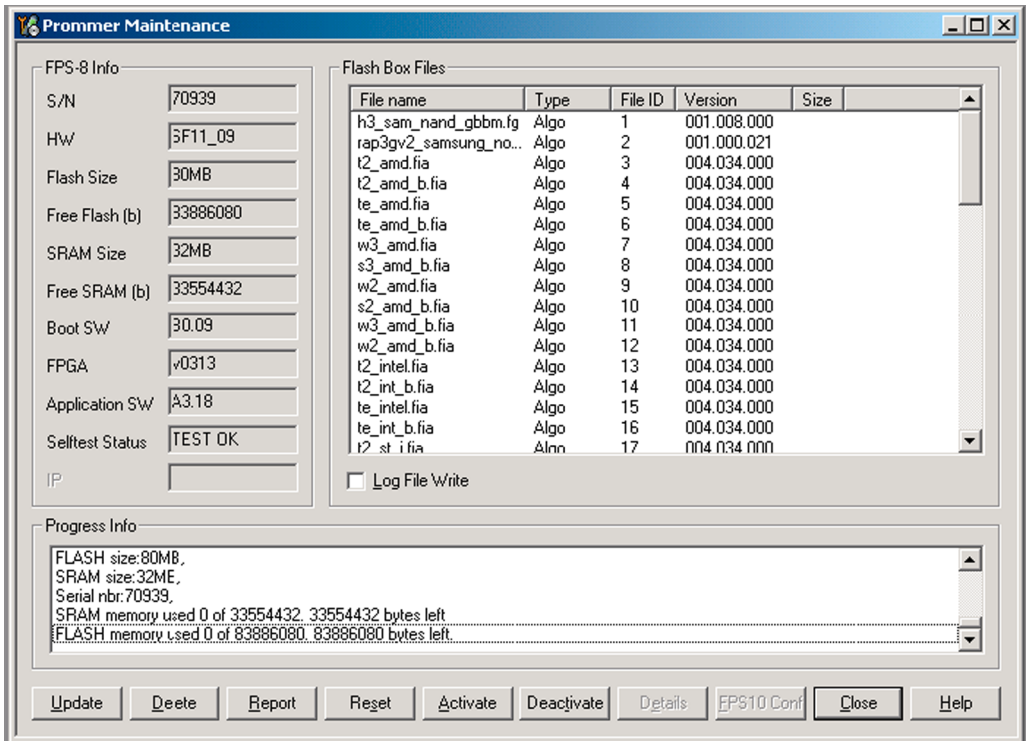

Figure 29 *Prommer Maintenance* window

Activating FPS-8

Context

Before FPS-8 can be successfully used for phone programming, it must first be activated.

First fill in the *FPS-8 activation request* sheet in the FPS-8 sales package, and follow the instructions given.

When activation file is received (for example, *00000.in*), copy it to the *C:|ProgramFiles|Nokia|Phoenix|BoxActivation* directory on your computer (this directory is created when *Phoenix* is installed).

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Steps

1. Start *Phoenix* service software.
2. Choose **Flashing→Prommer Maintenance** .
3. In the *Prommer Maintenance* window, click **Activate**.
4. To find the activation file, click **Browse**.
5. To activate the prommer, select the activation file and click **Open**.

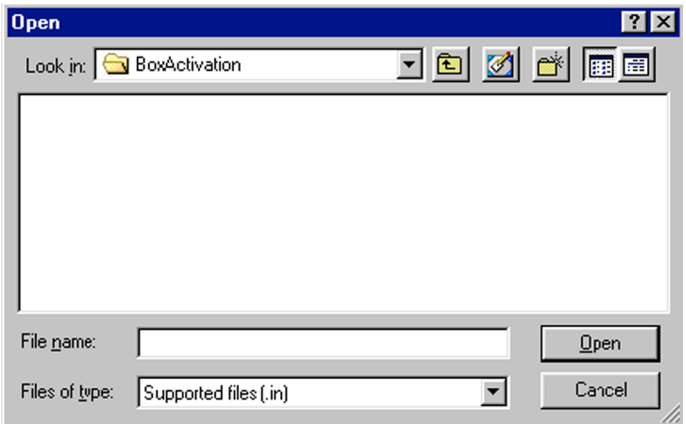

Figure 30 Box activation

6. To complete the activation, restart FPS-8.

Deactivating FPS-8

Context

If there is, for example, a need to send the FPS-8 box for repair, it must be deactivated first.

Steps

1. Start *Phoenix* service software.
2. Choose **Flashing→Prommer Maintenance** .
3. In the *Prommer Maintenance* window, click **Deactivate**.
4. To confirm the deactivation, click **Yes**.

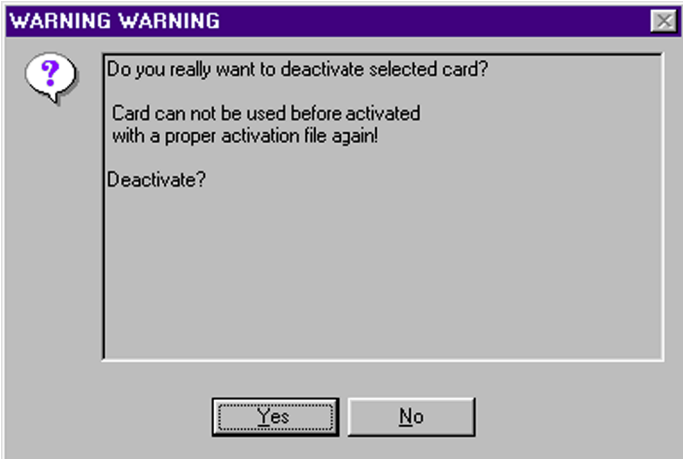

Figure 31 Deactivation warning

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The box is deactivated.

5. To complete the deactivation, restart FPS-8.

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4 — Service Tools and Service Concepts

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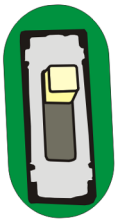
Service tools

Product specific tools

The table below gives a short overview of service tools that can be used for testing, error analysis and repair of product RM-140, refer to various concepts.

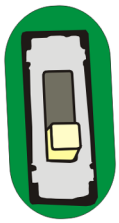
FS-24	Flash adapter	

- FS-24 is equipped with a clip interlock system
- provides standardised interface towards Control Unit
- provides RF connection using coupler
- multiplexing between USB and FBUS media, controlled by VUSB



Pos 1: Local CU-4
Phone powers up with CU-4 and SS-62 in local mode.
Flashing is not possible.
No usage with SS-46

Pos 2: Local SS-46
Usage with SS-46: phone powers up in Local Mode. Immediate flashing possible.
Usage with CU-4: flashing only (phone would power up in normal mode).



Pos 3: Flashing & EM calibration
Always power up the phone in Normal mode.
It can be flashed after changing to Local mode by using Phoenix.
Energy Management calibration must be done in this mode.

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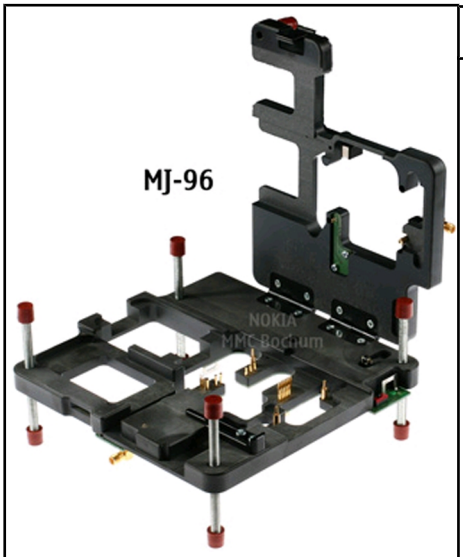


MJ-96	Module jig	

MJ-96 is meant for component level troubleshooting.

The jig includes an RF interface for GSM, WCDMA and Bluetooth. In addition, it has the following features:

- Provides mechanical interface with the engine module
- Provides galvanic connection to all needed test pads in module
- Multiplexing between USB and FBUS media, controlled by Vusb
- MMC interface
- Duplicated SIM connector
- Connector for control unit
- Access for AV- and USB connectors

Note: Be careful when closing the jig, not to harm the display with the screws on the jig!

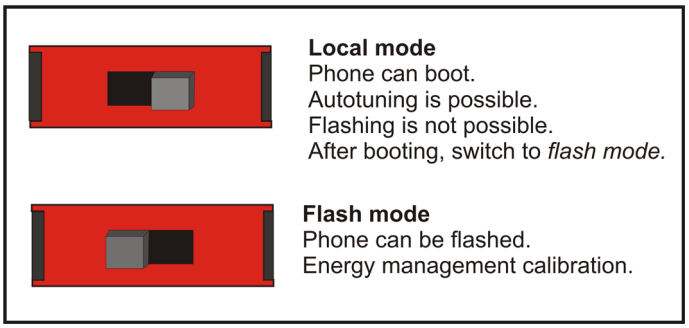
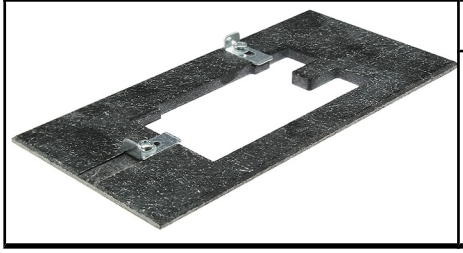


Figure 32 Mode switch



RJ-112	Soldering jig	

RJ-112 is a soldering jig used for soldering and as a rework jig for the engine module.

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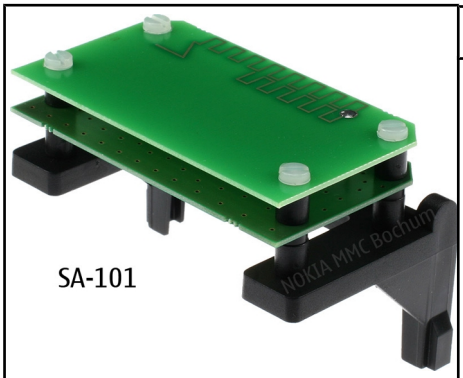

SA-101	RF coupler	

SA-101 is an RF coupler for WCDMA and GSM RF testing. It is used together with the product-specific flash adapter.

The following table shows attenuations from the antenna pads of the mobile terminal to the SMA connectors of SA-101:

Frequency	Att. (dB)
GSM900 TX	2,7 dB +/- 0,5 dB
GSM900 RX	2,6 dB +/- 0,7 dB
GSM1800 TX	8,2 dB +/- 2,0 dB
GSM1800 RX	5,3 dB +/- 0,4 dB
GSM1900 TX	5,1 dB +/- 0,1dB
GSM1900 RX	5,2 dB +/- 0,6 dB
WCDMA2100 TX	10,0 dB +/- 0,9dB
WCDMA2100 RX	6,8 dB +/- 0,4 dB

SS-111	Coax tool	

SS-81	Camera removal tool	

Camera removal tool for main camera.

General tools

The table below gives a short overview of service tools that can be used for testing, error analysis and repair of product RM-140, refer to various concepts.

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CU-4	Control unit	

CU-4 is a general service tool used with a module jig and/or a flash adapter. It requires an external 12 V power supply.

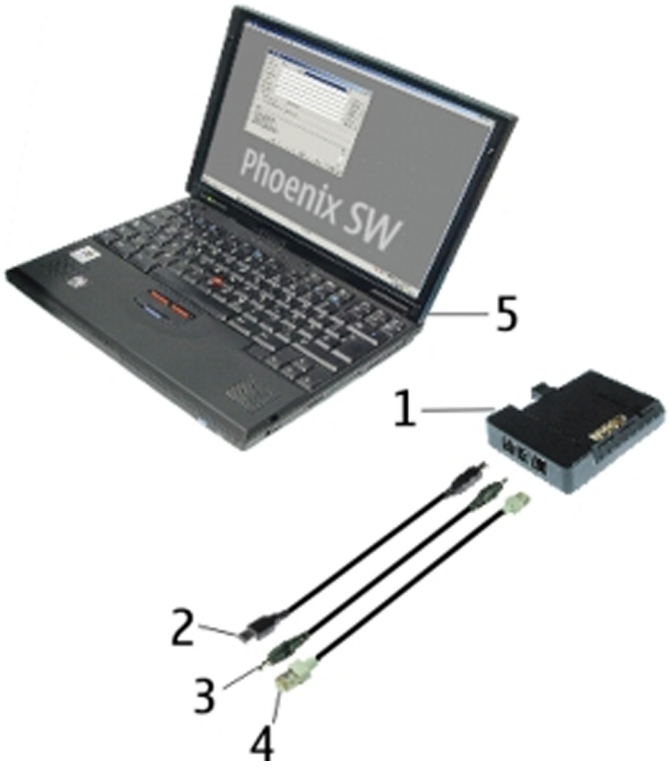
The unit has the following features:

- software controlled via USB
- EM calibration function
- Forwards FBUS/Flashbus traffic to/from terminal
- Forwards USB traffic to/from terminal
- software controlled BSI values
- regulated VBATT voltage
- 2 x USB2.0 connector (Hub)
- FBUS and USB connections supported

When using CU-4, note the special order of connecting cables and other service equipment:

Instructions

1 Connect a service tool (jig, flash adapter) to CU-4.
2 Connect CU-4 to your PC with a USB cable.
3 Connect supply voltage (12 V)
4 Connect an FBUS cable (if necessary).
5 Start Phoenix service software.



Note: Phoenix enables CU-4 regulators via USB when it is started.

Reconnecting the power supply requires a Phoenix restart.

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<table>
<tr><td rowspan="2"> </td><td>FLS-5</td><td>Flash device</td><td></td></tr>
<tr><td colspan="3">FLS-5 is a dongle and flash device incorporated into one package, developed specifically for POS use.</td></tr>
<tr><td rowspan="2"> </td><td>FPS-10</td><td>Flash prommer</td><td></td></tr>
<tr><td colspan="3">FPS-10 interfaces with:
• PC
• Control unit
• Flash adapter
• Smart card
FPS-10 flash prommer features:
• Flash functionality for BB5 and DCT-4 terminals
• Smart Card reader for SX-2 or SX-4
• USB traffic forwarding
• USB to FBUS/Flashbus conversion
• LAN to FBUS/Flashbus and USB conversion
• Vusb output switchable by PC command
FPS-10 sales package includes:
• FPS-10 prommer
• Power Supply with 5 country specific cords
• USB cable</td></tr>
<tr><td rowspan="2"> </td><td>JBT-9</td><td>Bluetooth test and interface box (sales package)</td><td></td></tr>
<tr><td colspan="3">The JBT-9 test box is a generic service device used to perform Bluetooth bit error rate (BER) testing, and establishing cordless FBUS connection via Bluetooth. An ACP-8x charger is needed for BER testing and an AXS-4 cable in case of cordless interface usage testing .
Sales package includes:
• JBT-9 test box
• Installation and warranty information</td></tr>
</table>

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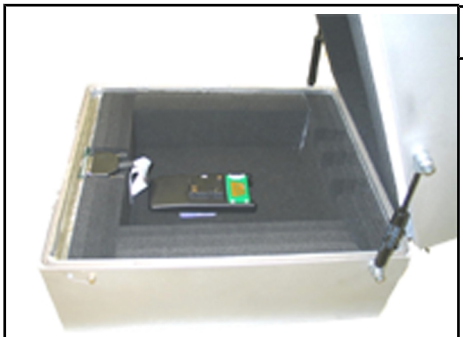
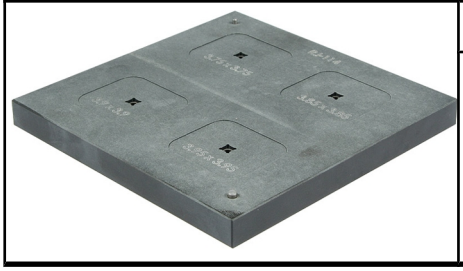
	JXS-1	RF shield box	
	Because the WCDMA network disturbs the RX side testing of the WCDMA phone and the Tx signal of the WCDMA phone can severely disturb the WCDMA network, a shield box is needed in all testing, tuning and fault finding which requires WCDMA RF signal. The shield box is not an active device, it contains only passive filtering components for RF attenuation.		
	PK-1	Software protection key	
	PK-1 is a hardware protection key with a USB interface. It has the same functionality as the PKD-1 series dongle. PK-1 is meant for use with a PC that does not have a series interface. To use this USB dongle for security service functions please register the dongle in the same way as the PKD-1 series dongle.		
	PKD-1	SW security device	
	SW security device is a piece of hardware enabling the use of the service software when connected to the parallel (LPT) port of the PC. Without the device, it is not possible to use the service software. Printer or any such device can be connected to the PC through the device if needed.		
	RJ-104	Rework jig	
	RJ-104 is a rework jig used when servicing the BTHFM module. It is used together with rework stencil ST-37.		
	RJ-114	Rework jig	
	RJ-114 is a rework jig used with ST-41.		

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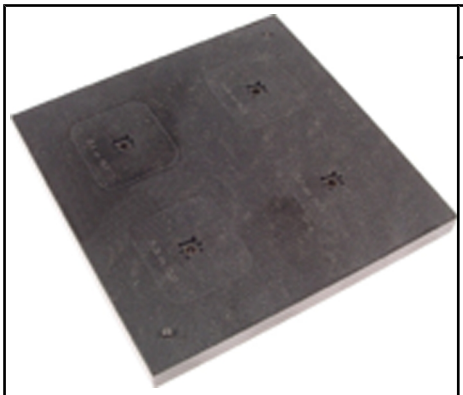	RJ-57	Rework jig	
	RJ-57 is a rework jig used with ST-22.		
	RJ-93	Rework jig	
	RJ-93 is used as a rework jig for the engine module. This stencil takes the front end module (FEM) or power amplifier (PA) module for spreading the soldering paste to the component. Must be used together with the ST-40 stencil.		
	SPS-1	Soldering Paste Spreader	
	SRT-6	Opening tool	
	SRT-6 is used to open phone covers and B-to-B connectors.		

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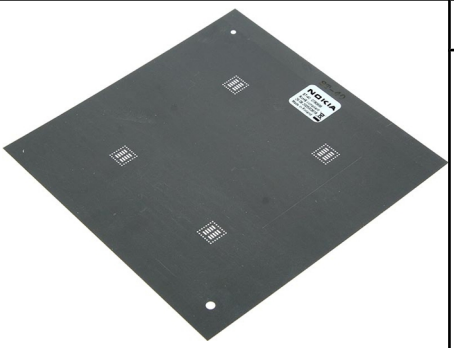
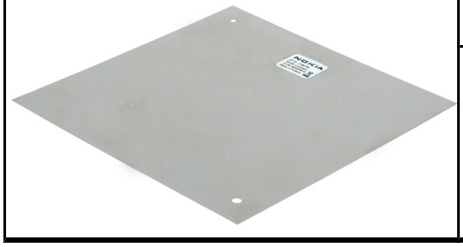
	SS-46	Interface adapter	
	SS-46 acts as an interface adapter between the flash adapter and FPS-10.		
	SS-62	Generic flash adapter base for BB5	
	• generic base for flash adapters and couplers • SS-62 equipped with a clip interlock system • provides standardised interface towards Control Unit • provides RF connection using galvanic connector or coupler • multiplexing between USB and FBUS media, controlled by VUSB		
	ST-37	BTHFM rework stencil	
	ST-37 stencil is used with RJ-104 BTHFM rework jig.		
	ST-40	rework stencil	
	ST-40 is a rework stencil and used with RJ-93.		
	ST-41	Rework stencil	
	ST-41 is a rework stencil used with rework jig RJ-114.		

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	ST-44	Rework stencil	
	ST-44 is a rework stencil used with rework jig RJ-57.		
	SX-4	Smart card	
	SX-4 is a BB5 security device used to protect critical features in tuning and testing. SX-4 is also needed together with FPS-10 when DCT-4 phones are flashed.		

Cables

The table below gives a short overview of service tools that can be used for testing, error analysis and repair of product RM-140, refer to various concepts.

	CA-31D	USB cable	
	The CA-31D USB cable is used to connect FPS-10 or FPS-11 to a PC. It is included in the FPS-10 and FPS-11 sales packages.		
	CA-35S	Power cable	
	CA-35S is a power cable for connecting, for example, the FPS-10 flash prommer to the Point-Of-Sales (POS) flash adapter.		

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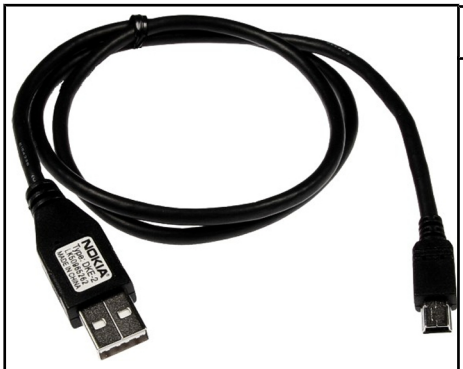
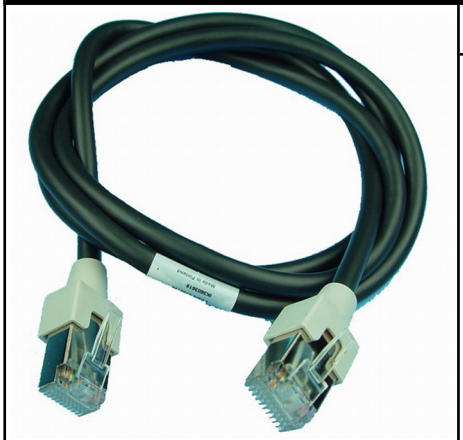


DKE-2	Mini-USB cable	
USB to mini-USB connector cable.		

PCS-1	Power cable	
The PCS-1 power cable (DC) is used with a docking station, a module jig or a control unit to supply a controlled operating voltage.		



XCS-4	Modular cable	
XCS-4 is a shielded (one specially shielded conductor) modular cable for flashing and service purposes.		

XRF-1	RF cable	
The RF cable is used to connect, for example, a module repair jig to the RF measurement equipment. SMA to N-Connector ca. 610mm. Attenuation for: • GSM850/900: 0.3+-0.1 dB • GSM1800/1900: 0.5+-0.1 dB • WLAN: 0.6+-0.1dB		

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Service concepts

POS (Point of Sale) flash concept

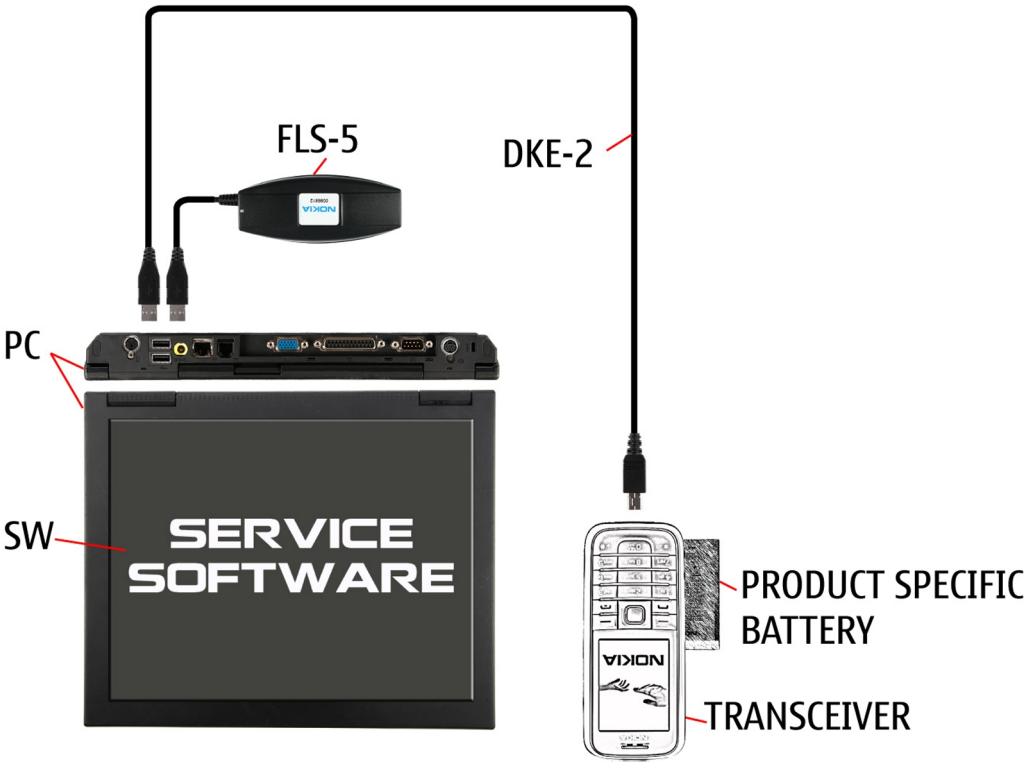

Figure 33 POS flash concept

Type	Description
Product specific tools	
BP-5M	Battery
Other tools	
FLS-5	POS flash dongle
	PC with Phoenix service software
Cables	
DKE-2	USB connectivity cable

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Flash concept with FPS-10

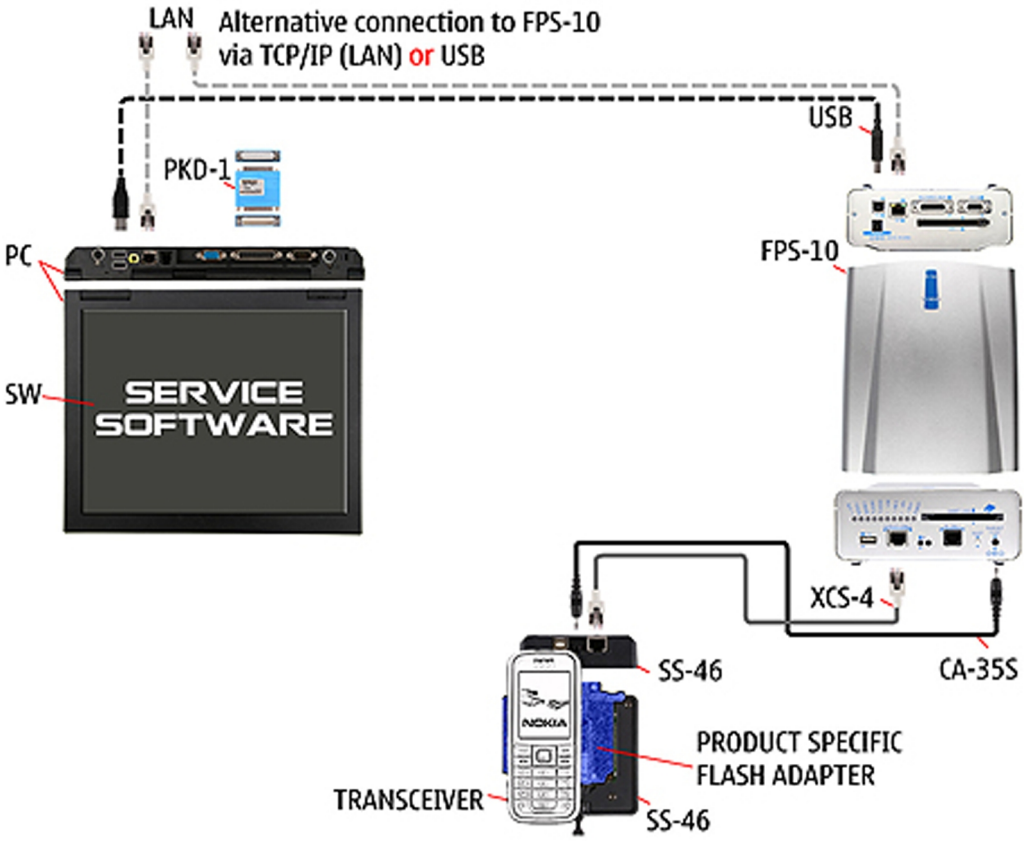

Figure 34 Basic flash concept with FPS-10

Type	Description
Product specific tools	
FS-24	Flash adapter
Other tools	
FPS-10	Flash prommer box
PKD-1/PK-1	SW security device
SS-46	Interface adapter
	PC with Phoenix service software
Cables	
XCS-4	Modular cable
CA-35S	Power cable
	USB cable

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CU-4 flash concept with FPS-10

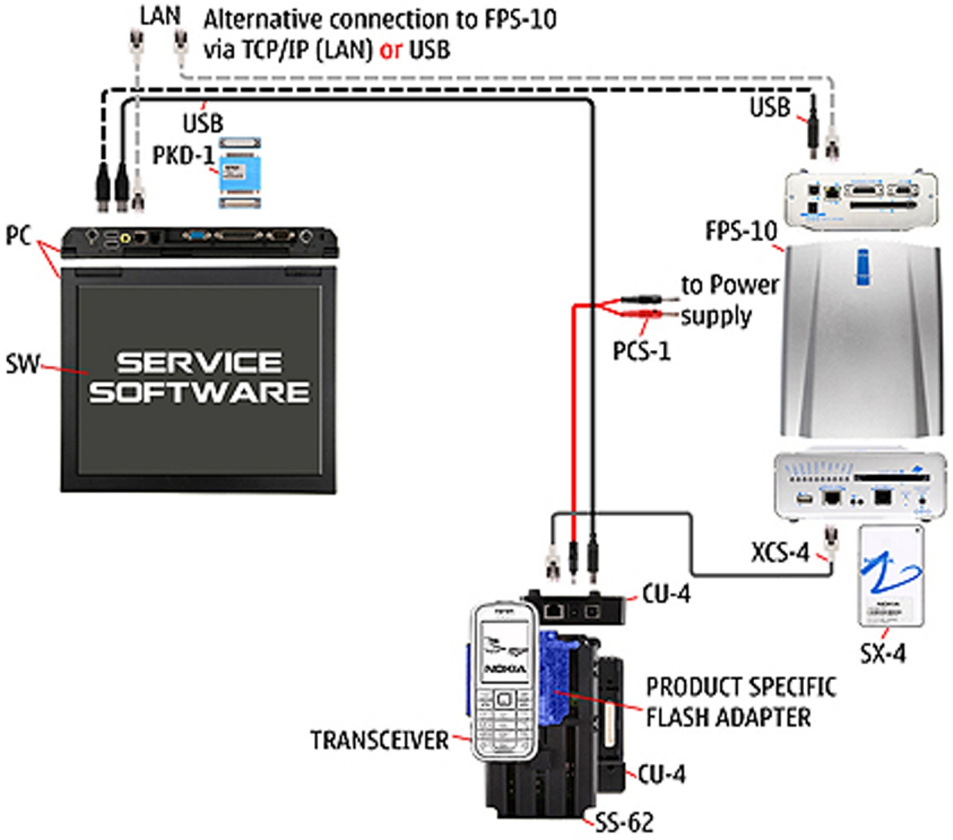

Figure 35 CU-4 flash concept with FPS-10

Type	Description
Product specific tools	
FS-24	Flash adapter
Other tools	
CU-4	Control unit
FPS-10	Flash prommer box
PKD-1/PK-1	SW security device
SS-62	Flash adapter base
SX-4	Smart card
	PC with Phoenix service software
Cables	
PCS-1	Power cable
XCS-4	Modular cable
	Standard USB cable
	USB cable

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Module jig service concept

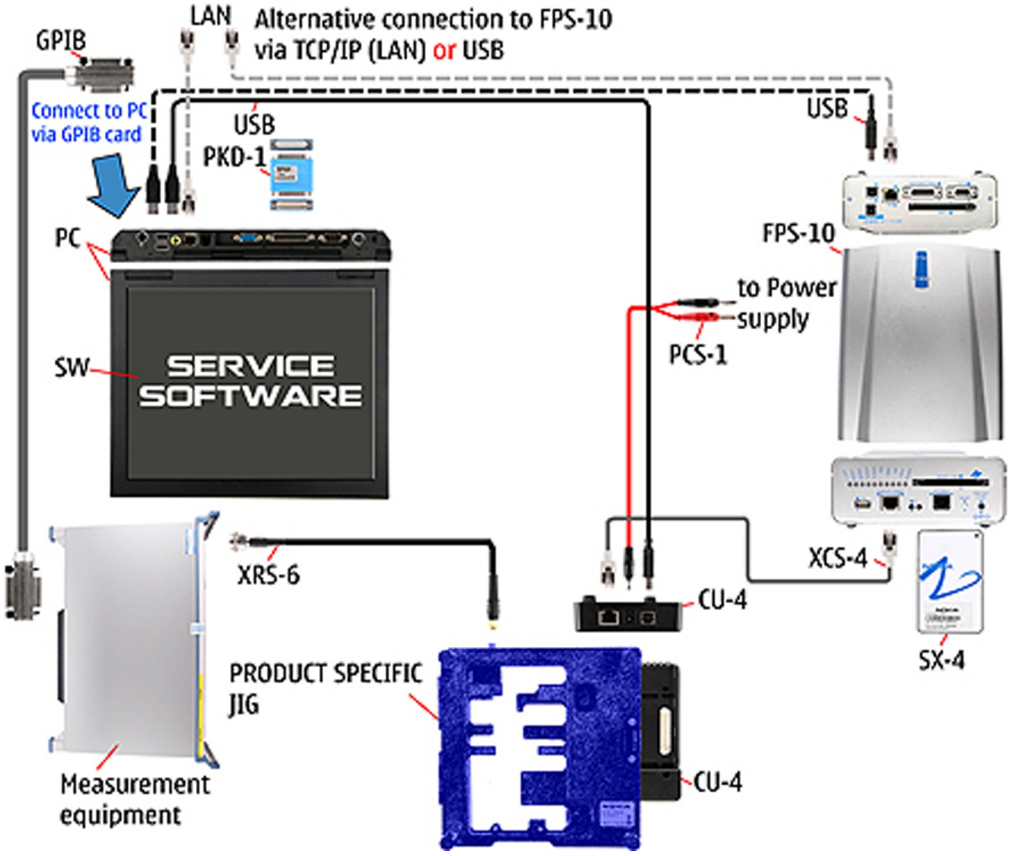

Figure 36 Module jig service concept

Type	Description
Phone specific tools	
MJ-96	Module jig
Other tools	
CU-4	Control unit
FPS-10	Flash prommer box
PKD-1/PK-1	SW security device
SX-4	Smart card
	PC with Phoenix service software
	Measurement equipment
Cables	
PCS-1	DC power cable
XCS-4	Modular cable
XRS-6	RF cable
	USB cable

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Type	Description
	GPIB control cable

RF testing concept with RF coupler

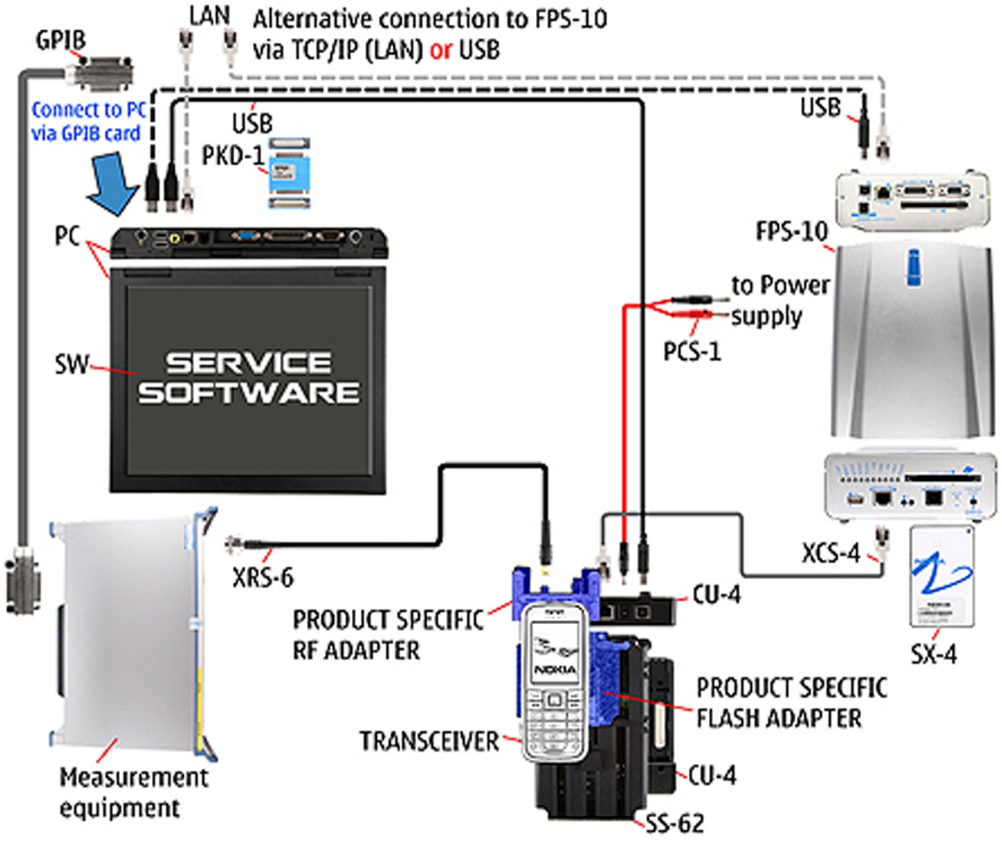

Figure 37 RF testing concept with RF coupler

Type	Description
Product specific tools	
FS-24	Flash adapter
SA-101	RF coupler
Other tools	
CU-4	Control unit
SX-4	Smart card
FPS-10	Flash prommer box
PKD-1/PK-1	SW security device
SS-62	Flash adapter base
	Measurement equipment
	PC with Phoenix service software
Cables	
PCS-1	Power cable

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Type	Description
XCS-4	Modular cable
XRS-6	RF cable
	GPIB control cable
	USB cable

Service concept for RF testing and RF/BB tuning

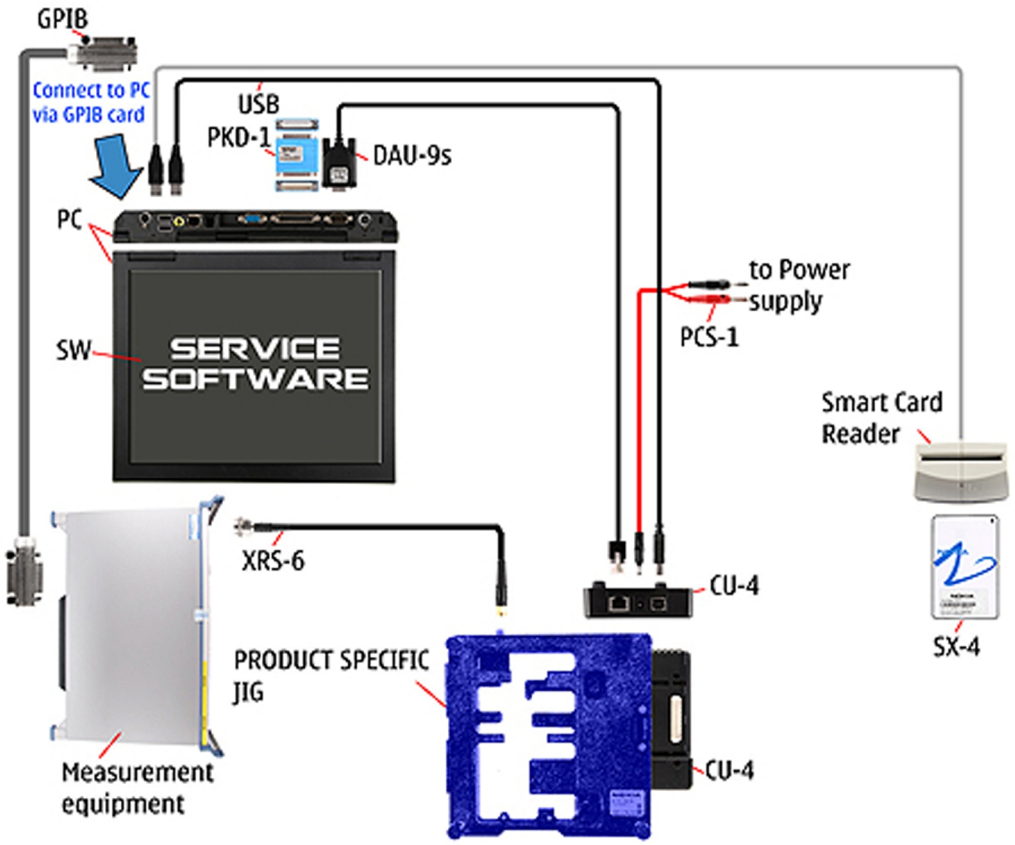

Figure 38 Service concept for RF testing and RF/BB tuning

Type	Description
Product specific tools	
MJ-96	Module jig
Other tools	
CU-4	Control unit
SX-4	Smart card
	Measurement equipment
	Smart card reader
	PC with Phoenix service software
Cables	

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Type	Description
DAU-9s	MBUS cable
PCS-1	DC power cable
PKD-1/PK-1	SW security device
XRS-6	RF cable
	GPIB control cable
	USB cable

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5 — Disassembly and reassembly instructions

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Upper block reassembly instruction.....5–13
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Lower block reassembly instruction.....5–32
Hinge disassembly instruction.....5–41

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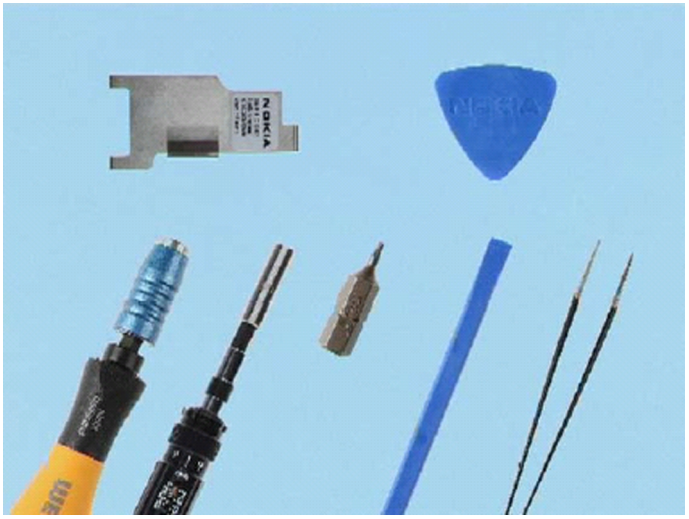
Upper block disassembly instruction

Steps

1. Needed tools: a Torx driver, a torque driver with a bit holder, a Torx plus size 4 bit, the SS-93, metal tweezers, the SS-111 connector opening tool and the SRT-6.



2. Always cover all sensitive surfaces with a protective film.

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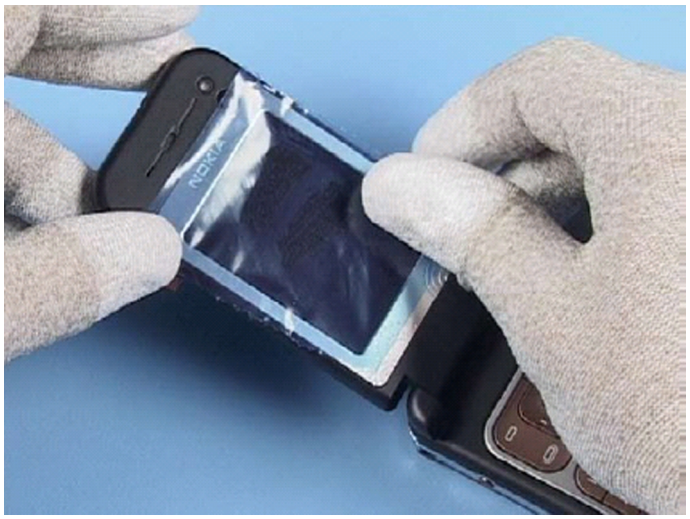
3. Open and remove the BATTERY COVER. If a battery is inserted, take it out.

4. Protect the window with the film.



5. To separate the covers of the upper block begin with the SRT-6 on the shown side.

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6. Gently, slide the opening tool along the gap to open all snaps of the cover.

7. Do the same on the shown side.

8. Now, remove the UPPER B-COVER.

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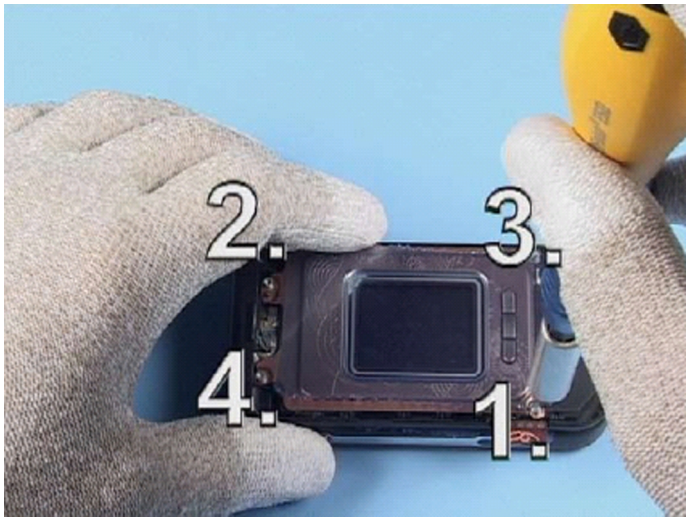
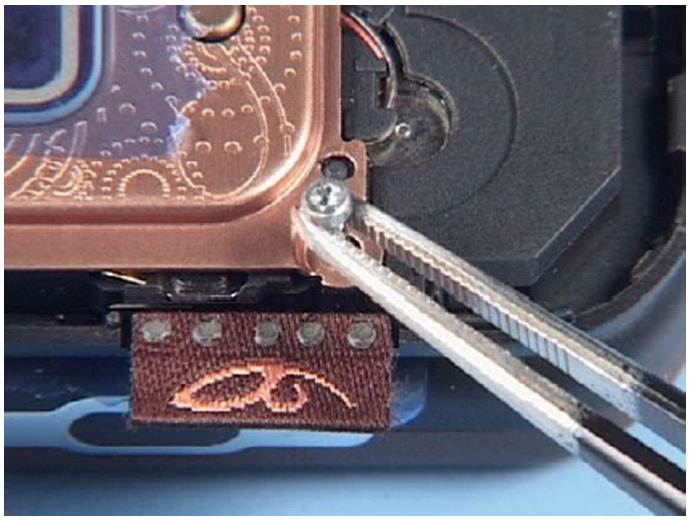
9. Locate the (4) M1.4x3.6 Torx Plus 4IP screws and unscrew them in the order shown.



10. Remove the screws.



11. Remove the SECOND DISPLAY FRAME ASSY.

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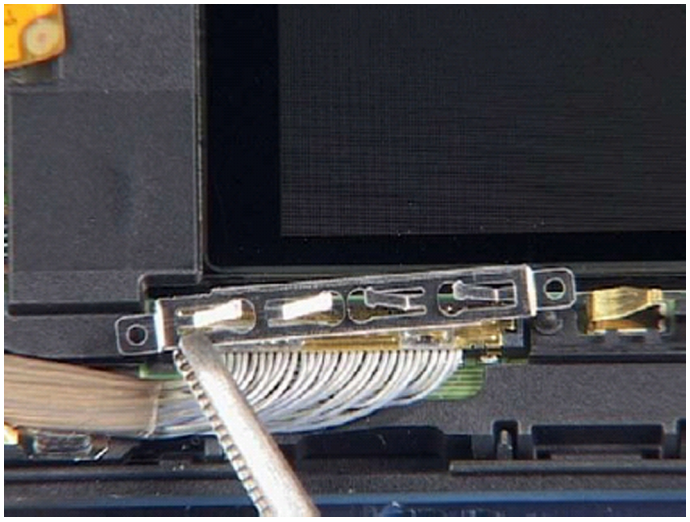
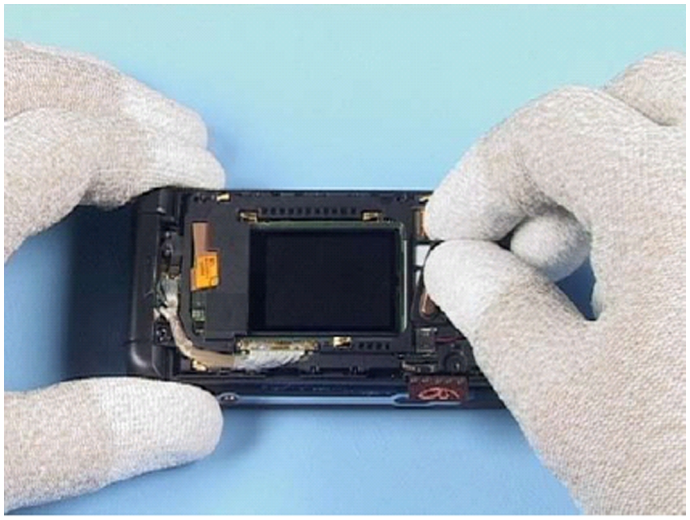
12. Use tweezers to remove COAX PWB GROUNDING SPRING.



13. Remove the CUI KEYS.



14. Cover the display surface with the protective film.

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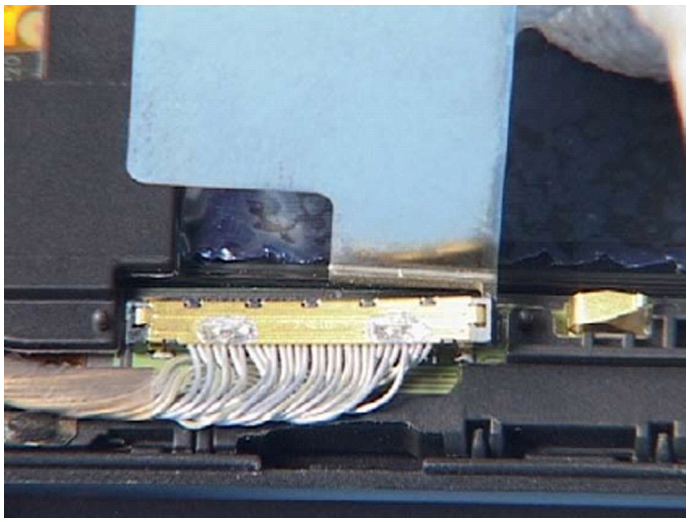
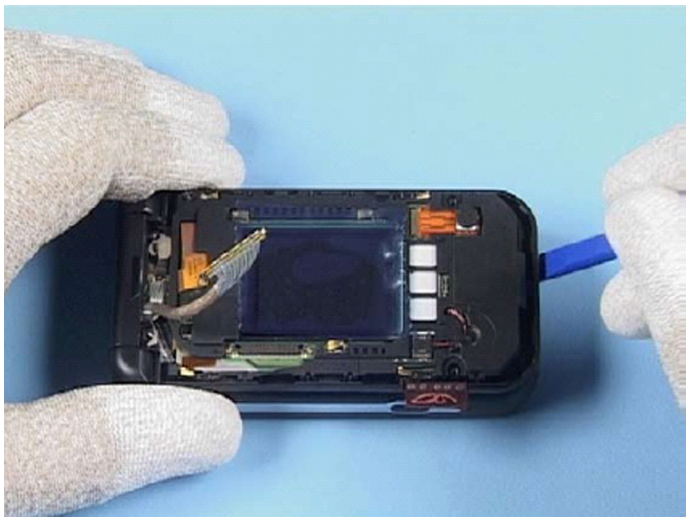
15. Be very careful, when opening the COAX CONNECTOR . Start on the shown side and gently raise the connector with opening tool.



16. Unlock the UPPER C-COVER ASSY using the SS-93...



17. ...and remove it from the A-COVER ASSY.

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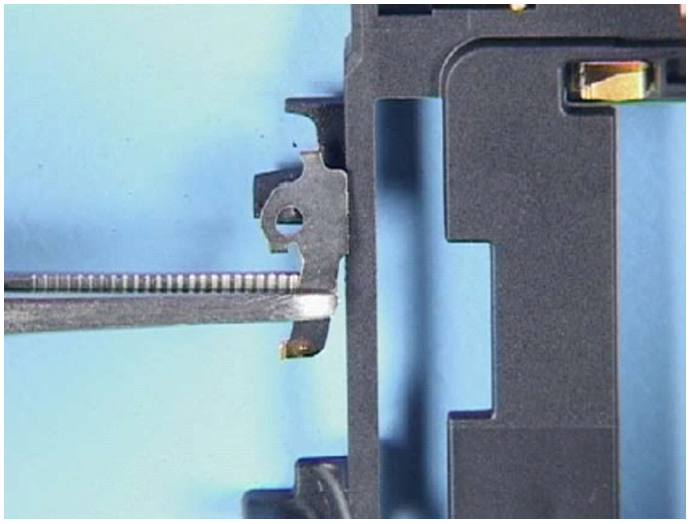
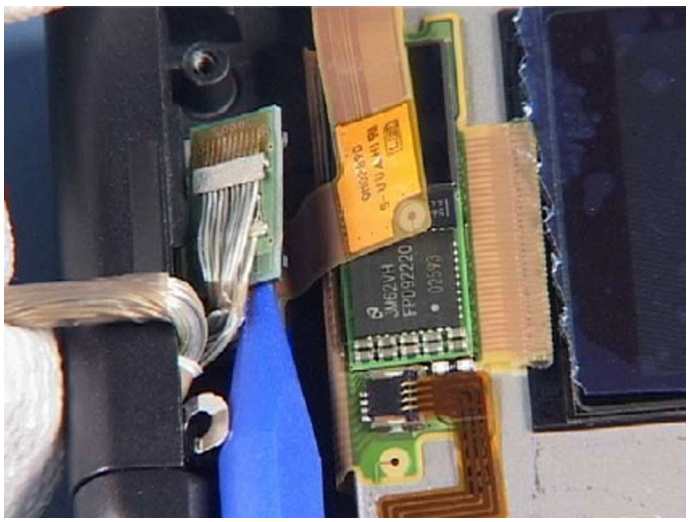
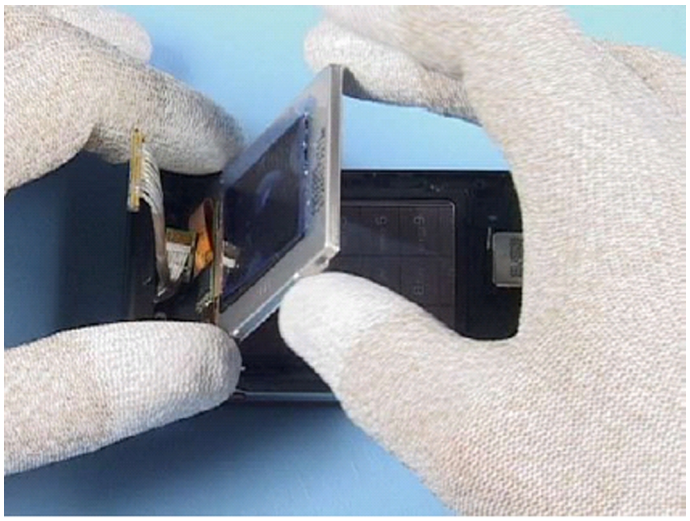
18. Now, the COAX GROUNDING SPRING can be removed.



19. Using SS-93, gently open the display connector.



20. Lift the display assembly as shown...



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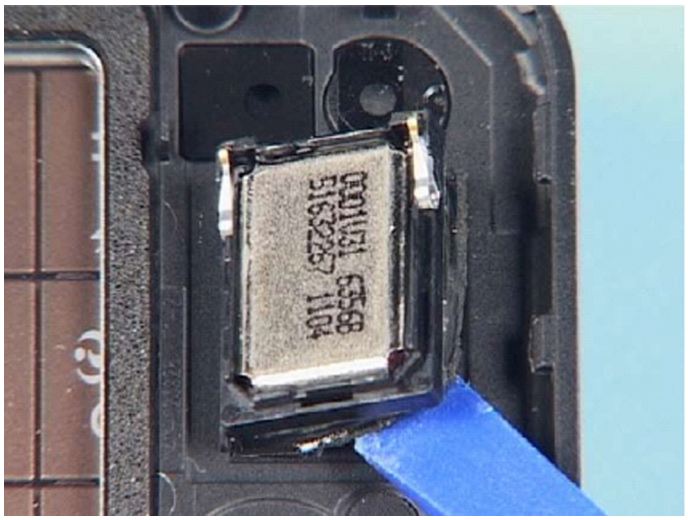
21. ...and, using SS-93, carefully pull out the display connector from the UPPER A-COVER.

22. Cover the display surface with the protective film.

23. Remove the IHF SPEAKER, first breaking the adhesive seal and then lifting it from position and discard it.



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24. The disassembly procedure is now completed.

Upper block reassembly instruction

Steps

1. Always use a new IHF SPEAKER if once removed.

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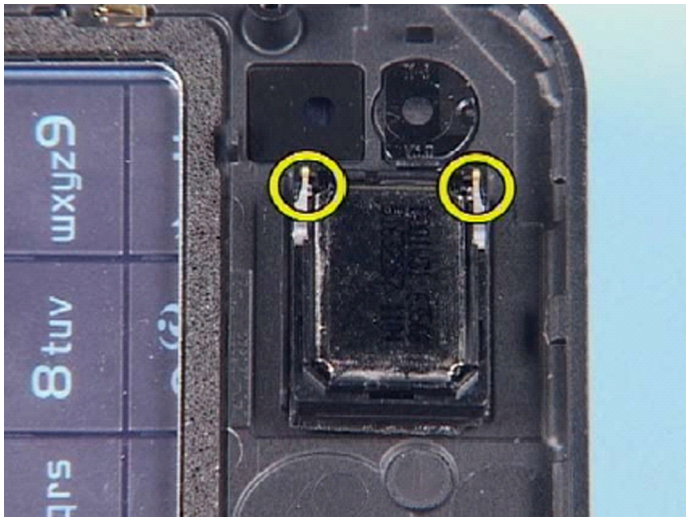
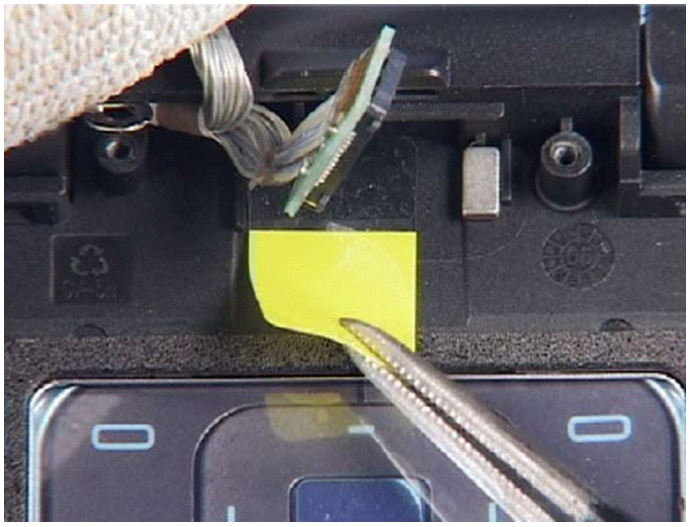
2. Pay attention to the right position of the IHF SPEAKER when assembling. Do not touch the spring contacts.



3. When using a new A-COVER ASSY remove the adhesive seal protection film.



4. Remove the protection film...

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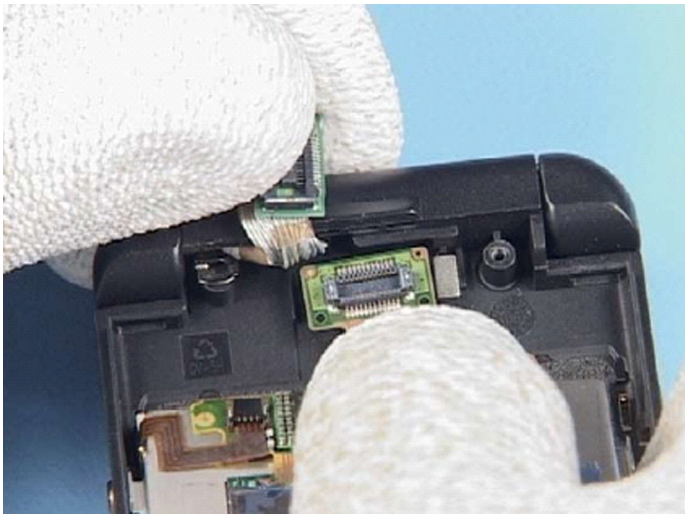
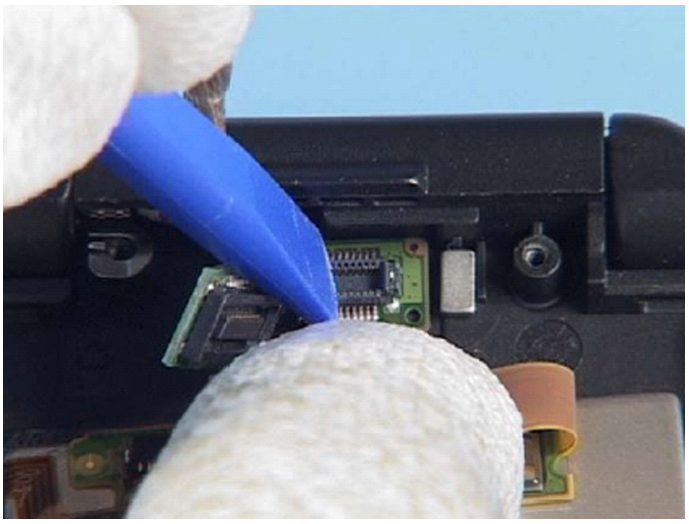
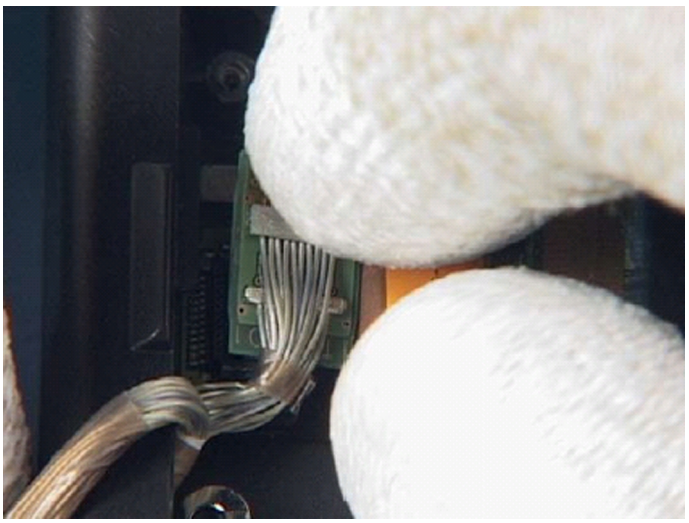
5. ...and maneuver the display connector exactly into place over the adhesive tape.



6. And secure it by pressing it gently.



7. Close the display connector.



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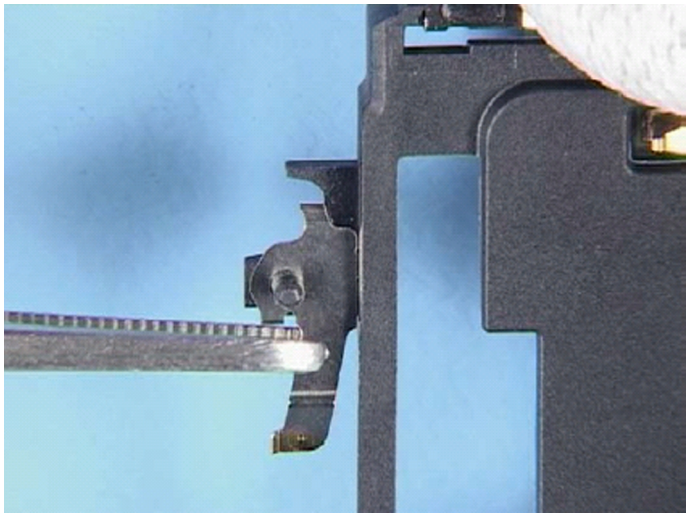
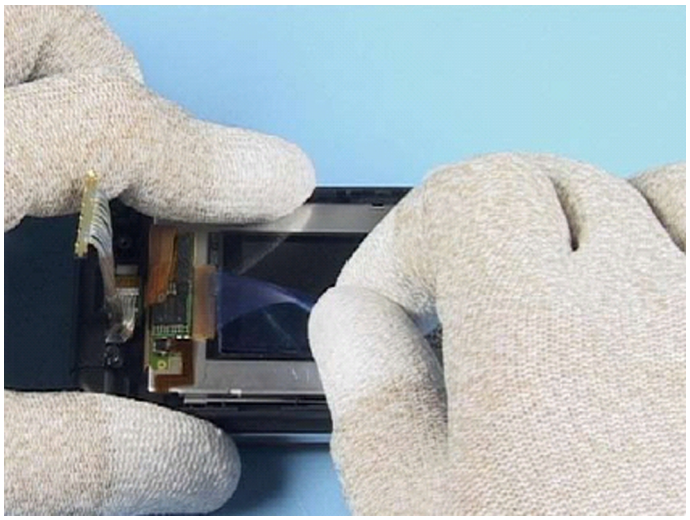
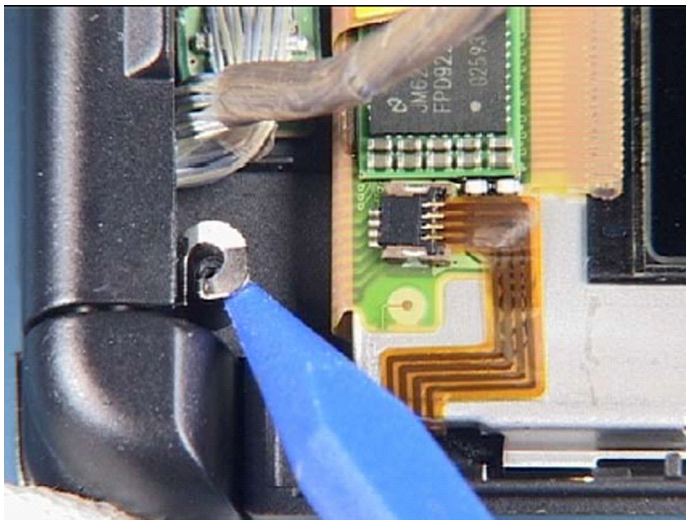
8. Fit the COAX GROUNDING SPRING to the UPPER C-COVER.



9. Now, remove the protection film.



10. Lift the metal tab as shown...



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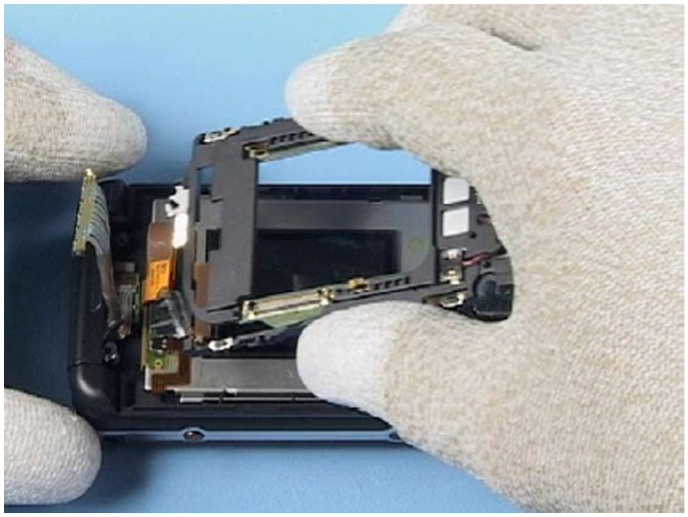
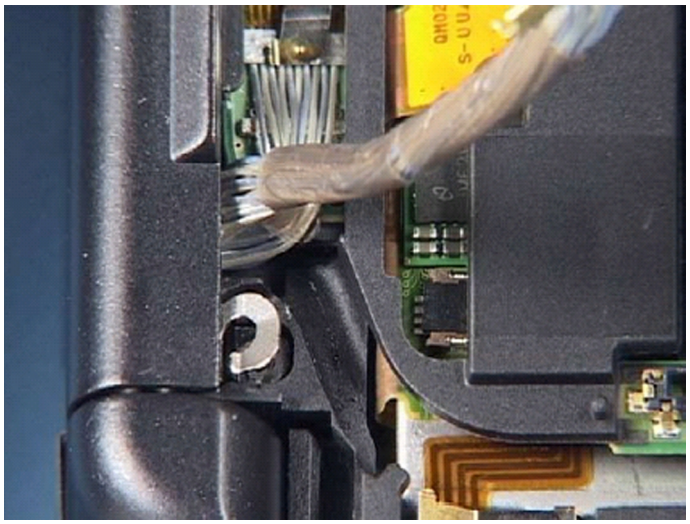
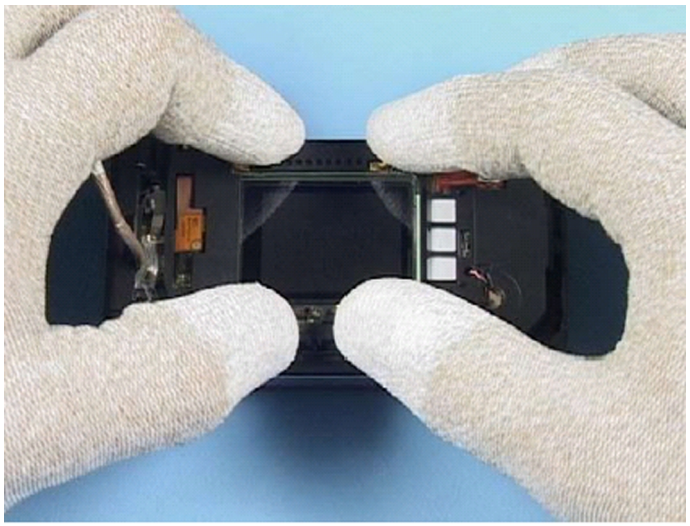
11. Fit the UPPER C-COVER ASSY.



12. Pay attention to the right position of the metal tab. It must be placed over the screw hole of the UPPER C-COVER.



13. Secure the UPPER C-COVER ASSY by pressing it into its position.



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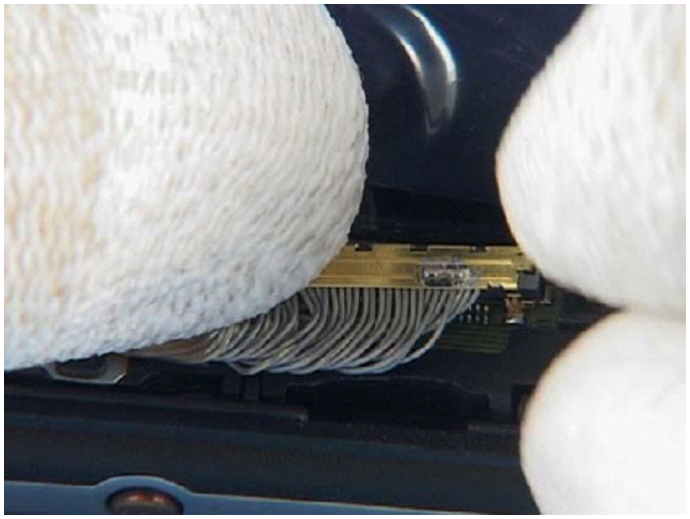
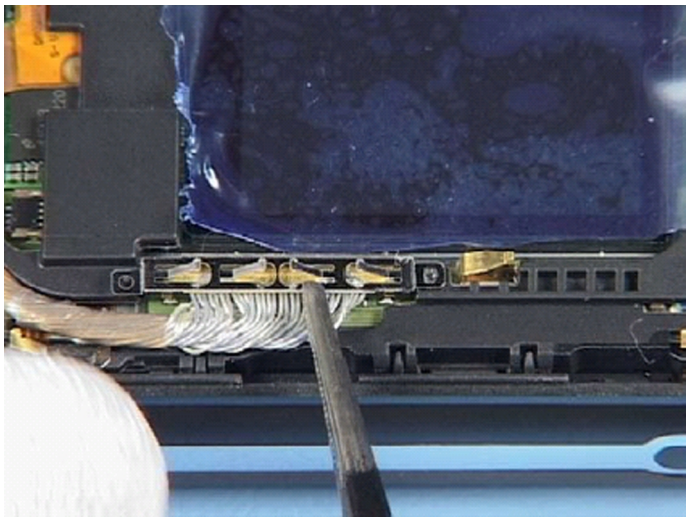
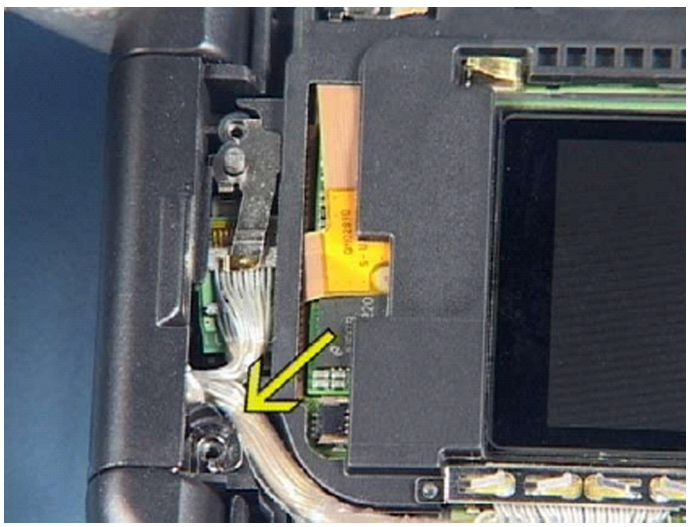
14. After covering the display, gently close the COAX CONNECTOR.



15. Place the COAX PWB GROUNDING SPRING over the connector.



16. Check the right position of the COAX CABLE.



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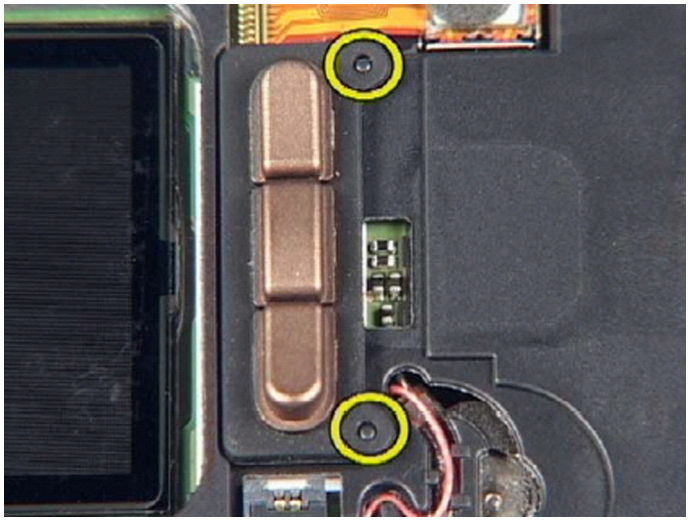
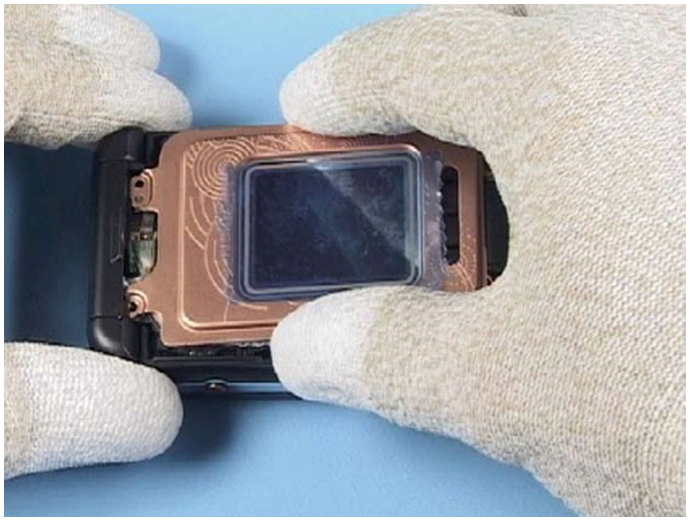
17. Fit the CUI KEYS and check the right position.



18. Align the SECOND DISPLAY FRAME ASSY with the UPPER CCOVER.



19. Insert the screws.

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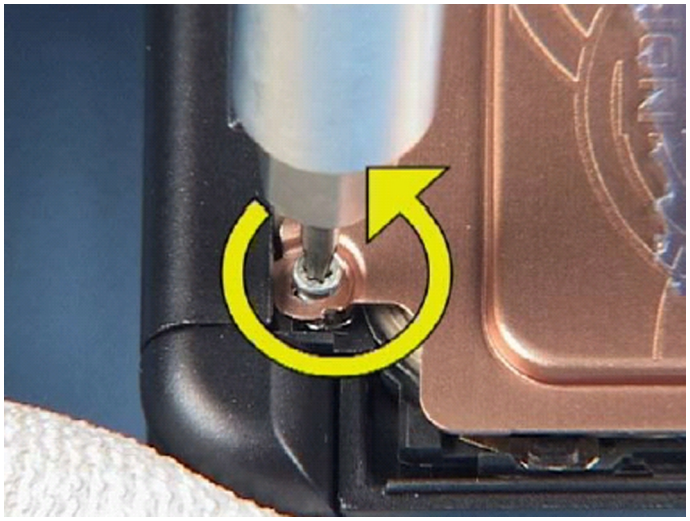
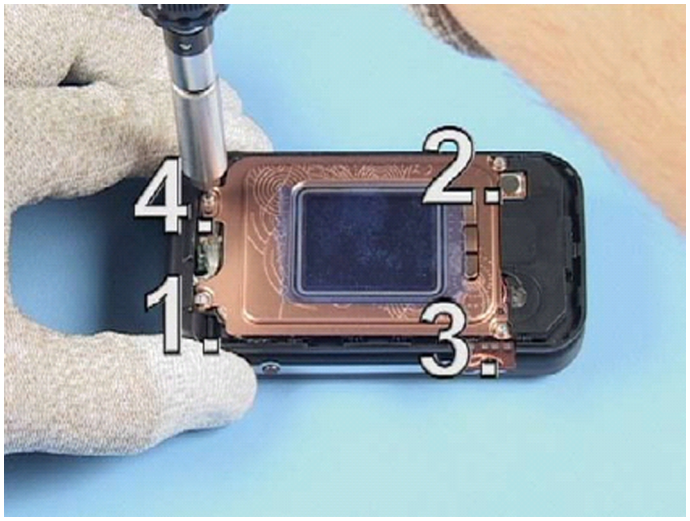
20. Set the torque driver to the torque of 15 Newton centimeter.

21. To avoid damaging the threads first turn the screws slightly left to engage the threads and then tighten them lightly.



22. Tighten the screws to the correct torque in the order shown.



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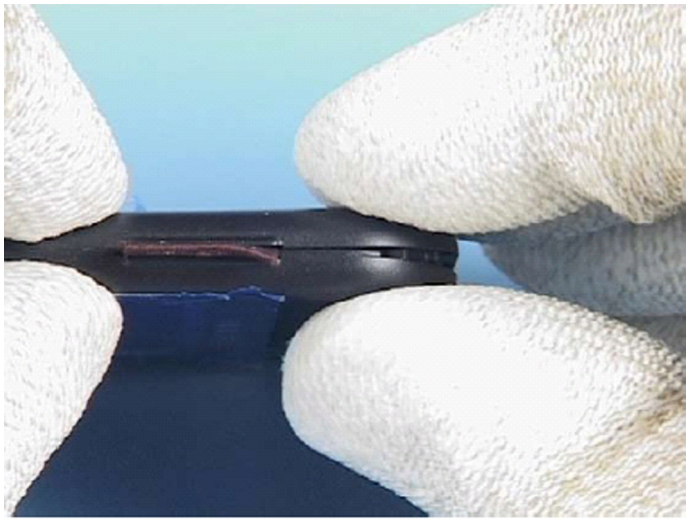
23. Fit the UPPER B-COVER...

24. ...and secure it by squeezing the covers.



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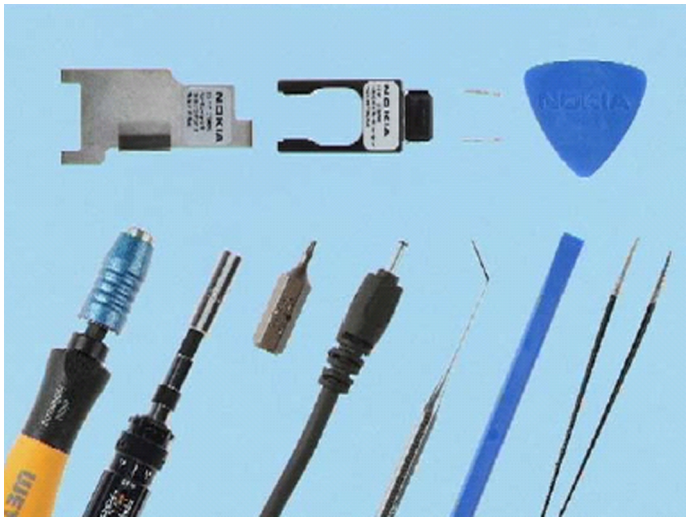
Lower block disassembly instruction

Steps

1. Needed tools: a Torx driver, a torque driver with a bit holder, a Torx plus size 6 bit, a DC-plug, a dental pick, the SS-93, metal tweezers, the SS-111 connector opening tool, the SS-81 camera removal tool and the SRT-6.



2. Open and remove the BATTERY COVER. If a battery is inserted, take it out.

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3. Cover the sensitive surfaces with a protective film.

4. Use the SS-93 to unlock the KEYMAT start on the shown side.

5. Remove the KEYMAT from the LOWER A-COVER.

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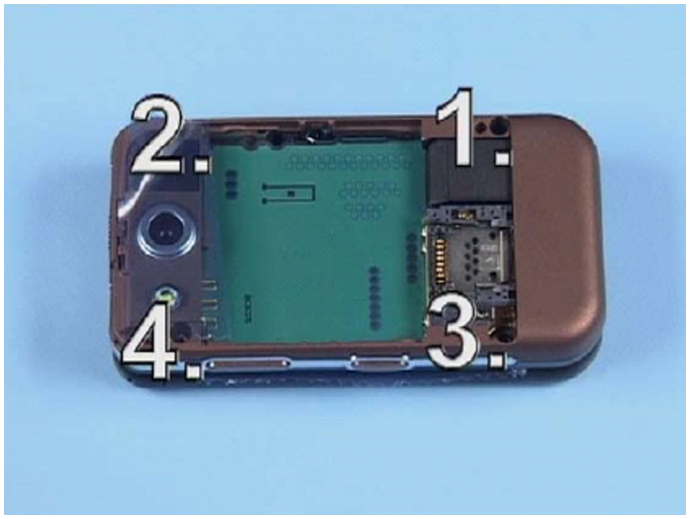
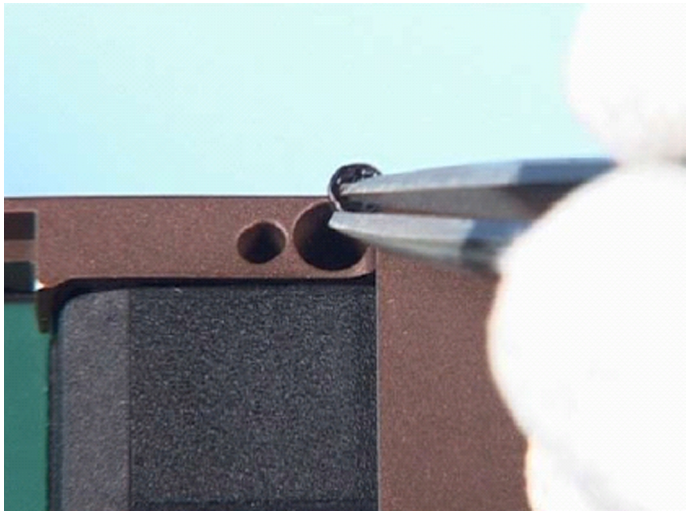
6. Unscrew the screws in the order shown.



7. Remove the SCREWS.



8. Start to release the LOWER B-COVER by opening the snaps on the shown side.

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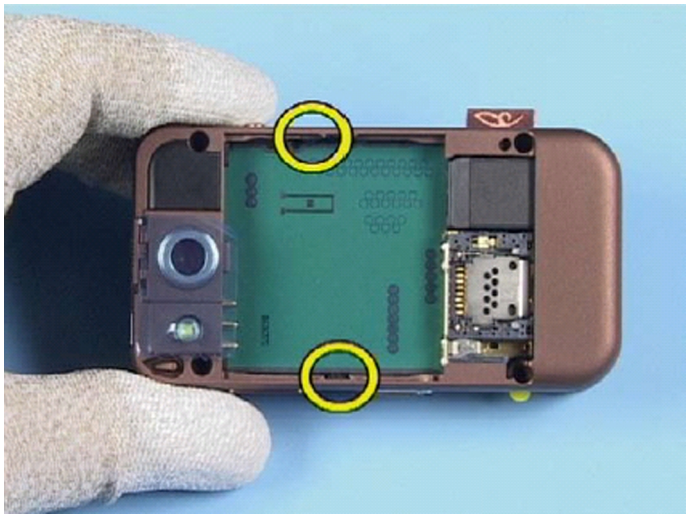
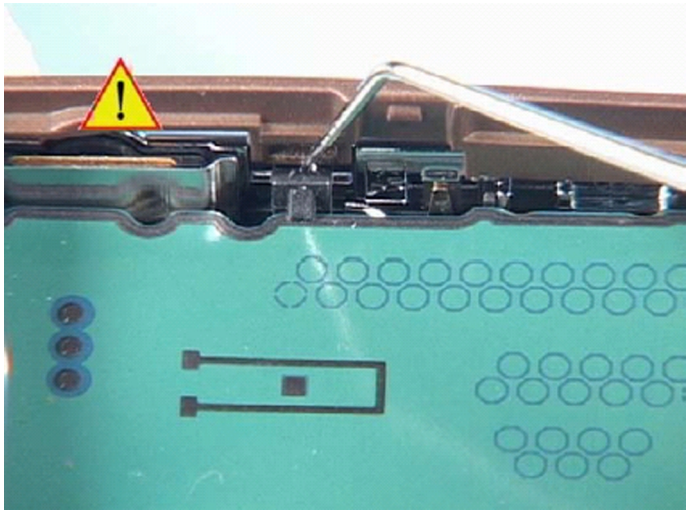
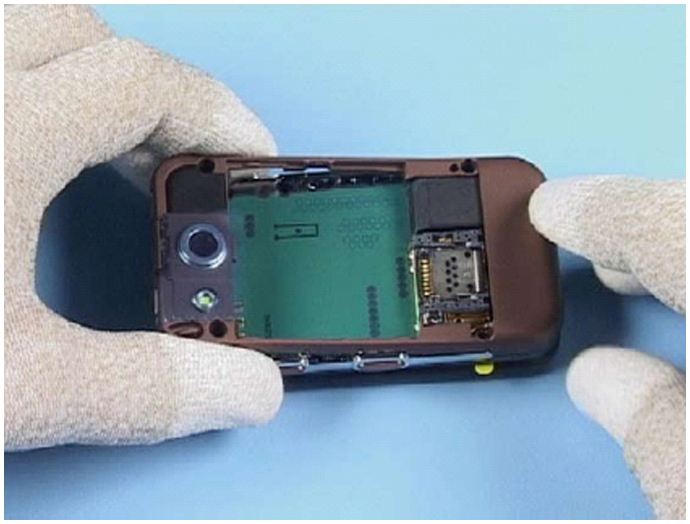
9. The LOWER B-COVER is additionally secured with two snaps to the LOWER A-COVER.



10. Gently, open the snaps on both sides with the dental pick.



11. Lift a bit the LOWER B-COVER, ...



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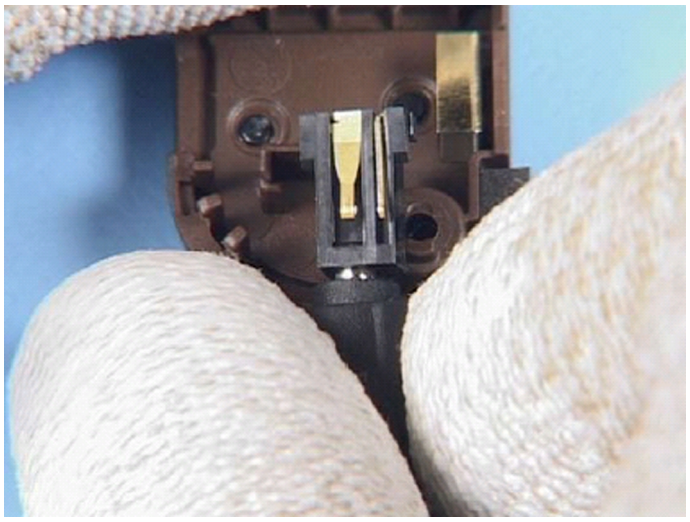
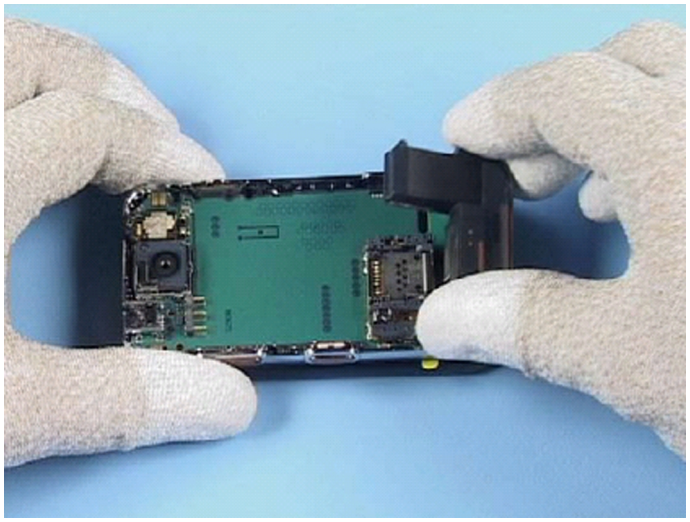
12. ...unlock the remaining snaps and remove the LOWER BCOVER.

13. Use the DC-plug to remove the DC-JACK.



14. Remove the ANTENNA ASSY.



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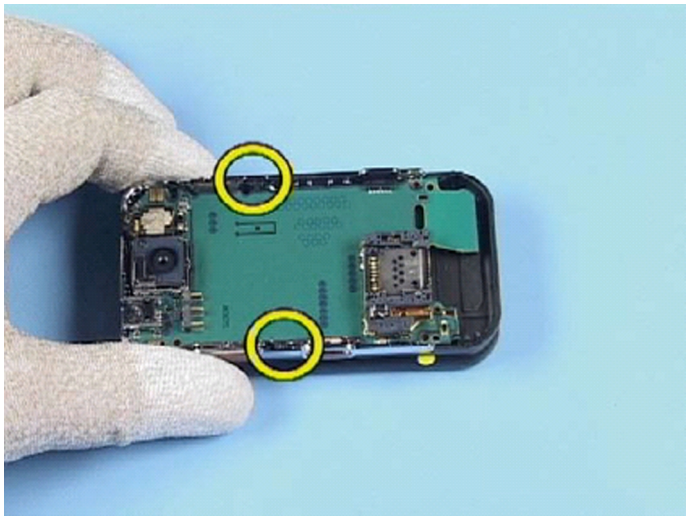
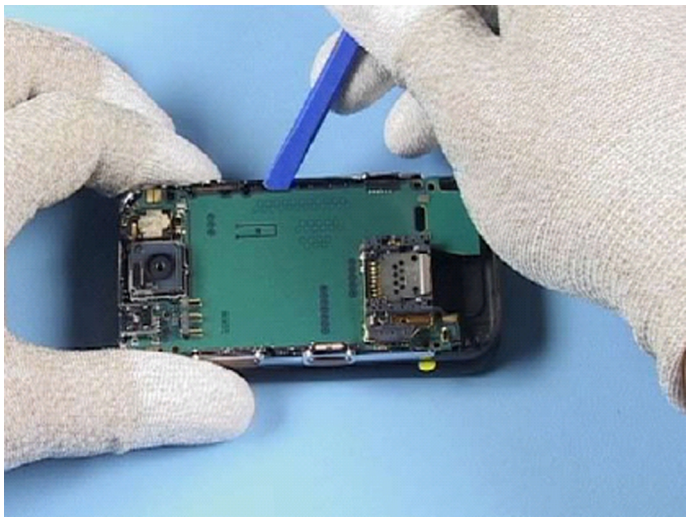
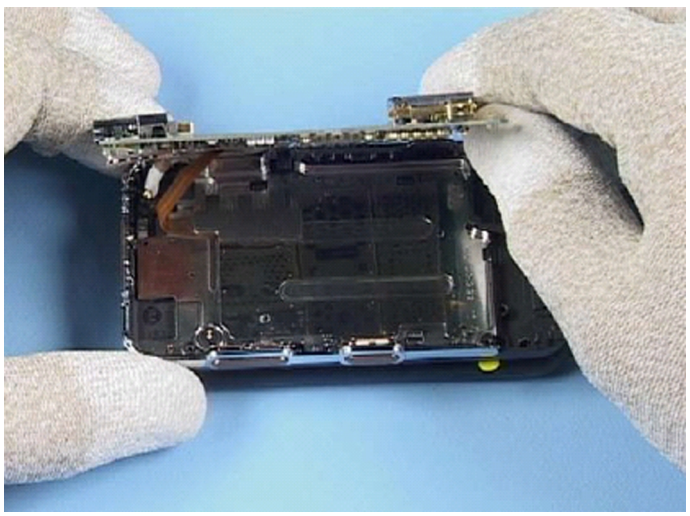
15. The PWB is secured with two snaps to the LOWER A-COVER.



16. Release the PWB...



17. and very gently, open it as shown.



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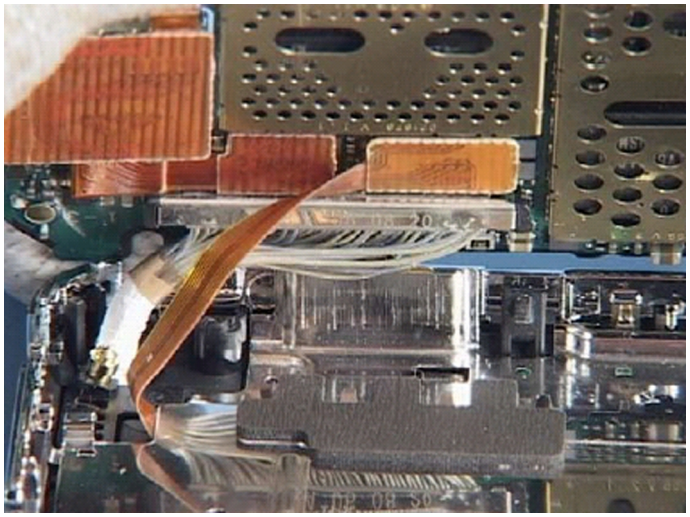
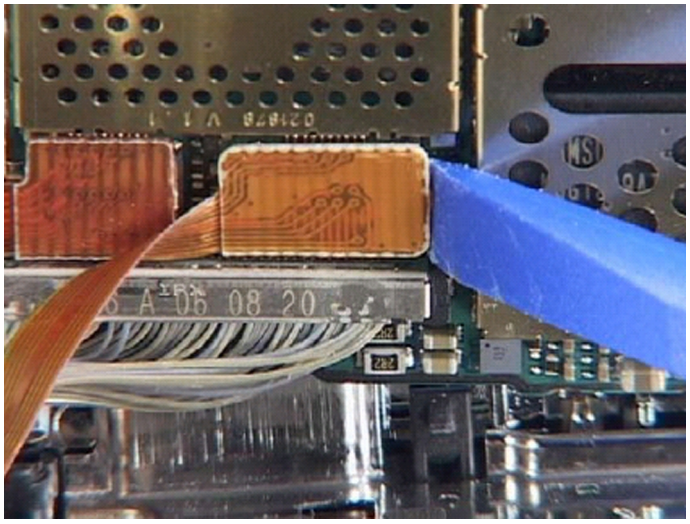
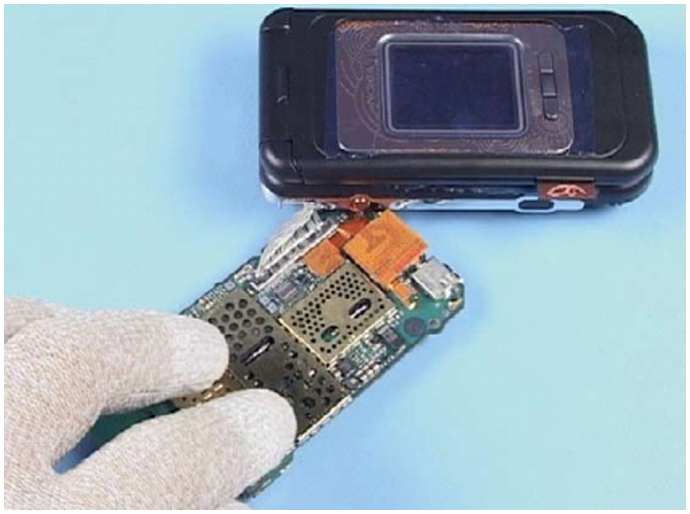
18. Take a special care the on flexible cords.



19. First open the connector of the LOWER FLEX ASSEMBLY...



20. ...and than gently place the PWB on the table.



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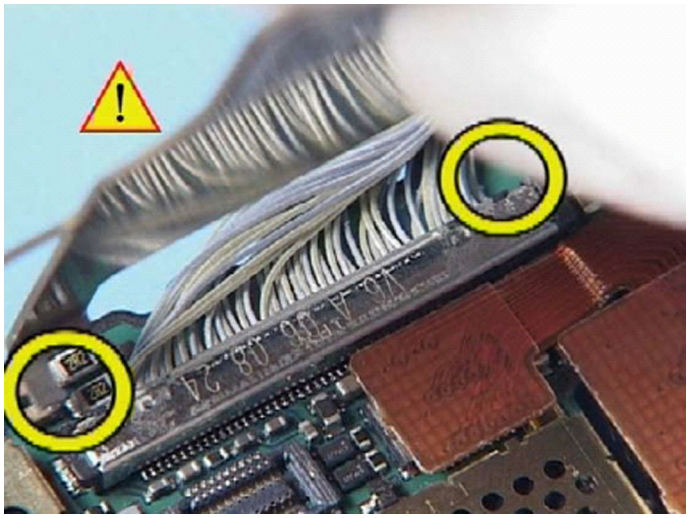
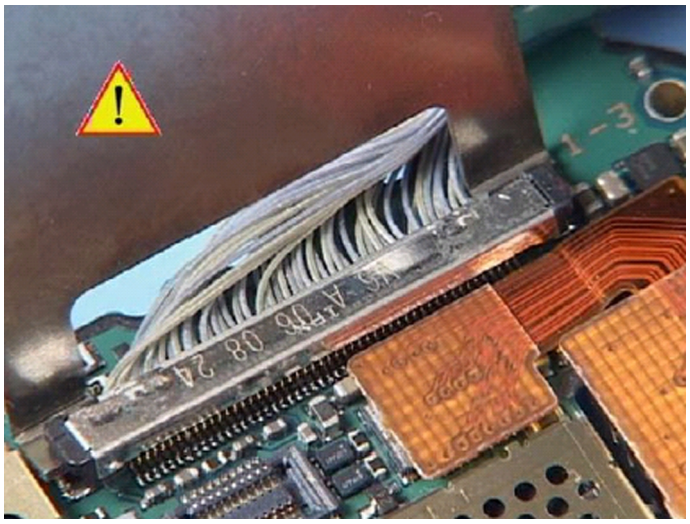
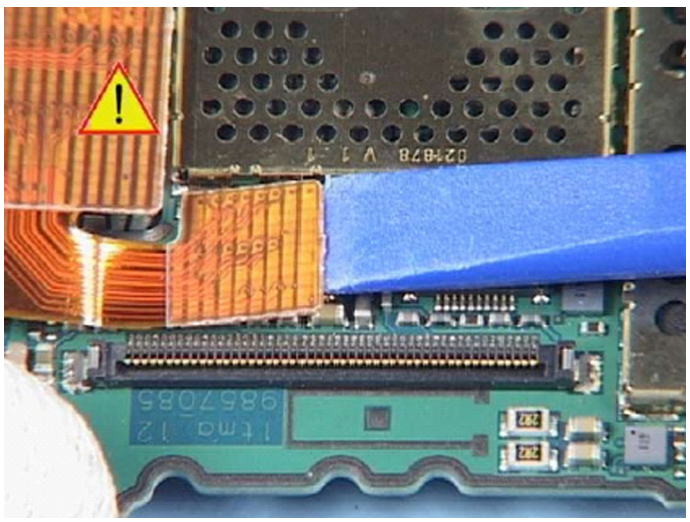
21. Insert the SS-111 below the flanks of the COAX CONNECTOR. Do not touch surrounding components.



22. Very gently lever the COAX CONNECTOR.



23. Disconnect the MAIN CAMERA with SS-93 paying attention on fragile components.



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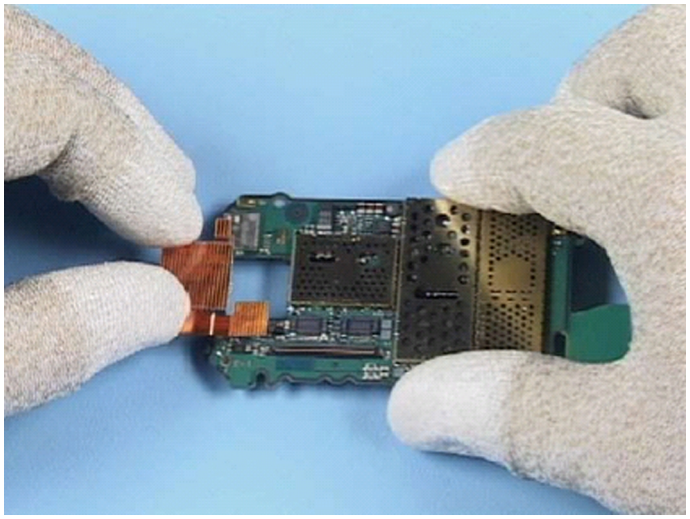
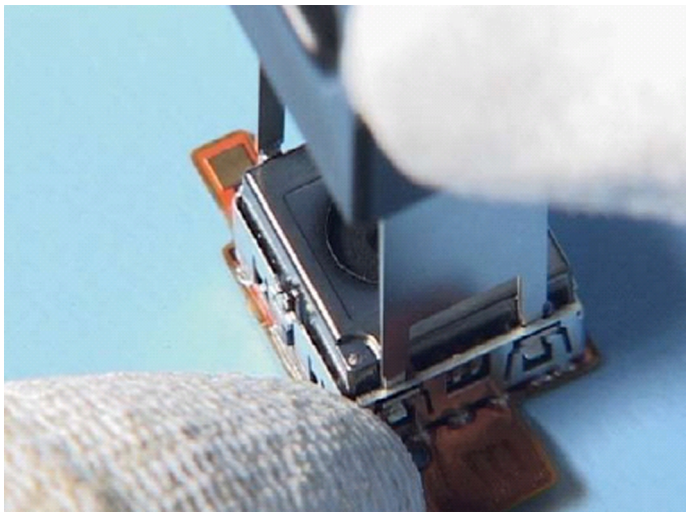
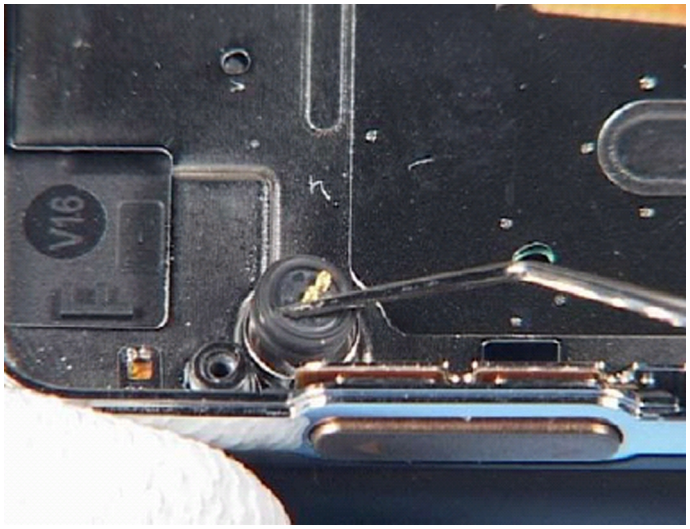
24. Take out the MAIN CAMERA from the PWB.



25. Insert the SS-81 into the CAMERA socket until the snaps open and remove the MAIN CAMERA from the CAMERA FLEX CONNECTOR.



26. Remove the MICROPHONE.



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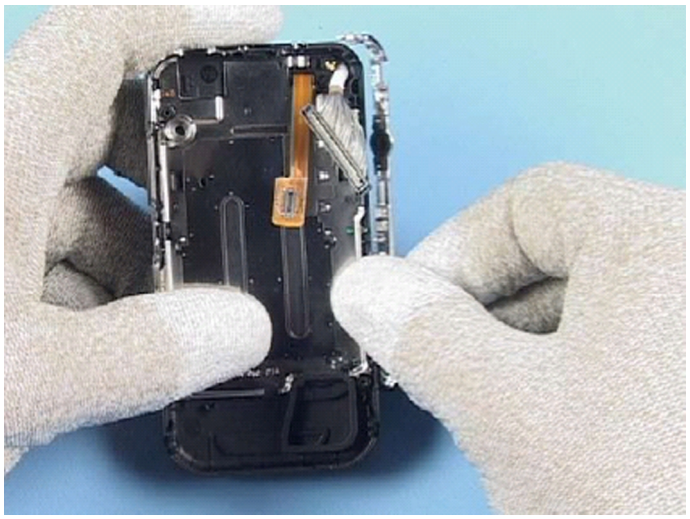
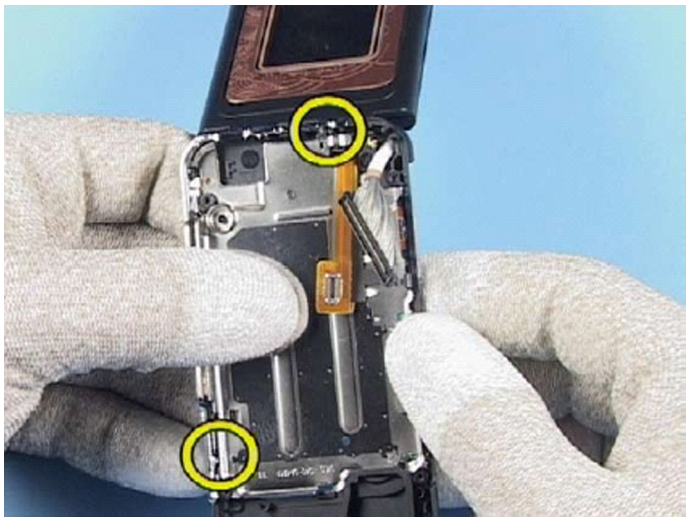
27. Before removing the LOWER C-COVER ASSEMBLY, first remove the shown decoration part. Be careful as this is no a spare part.



28. Bend a bit the LOWER A-COVER to release the metal clips of the LOWER C-COVER.



29. and remove the LOWER C-COVER ASSEMBLY.

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30. The disassembly procedure is now finished.

Lower block reassembly instruction

Steps

1. Gently fit the decoration part.

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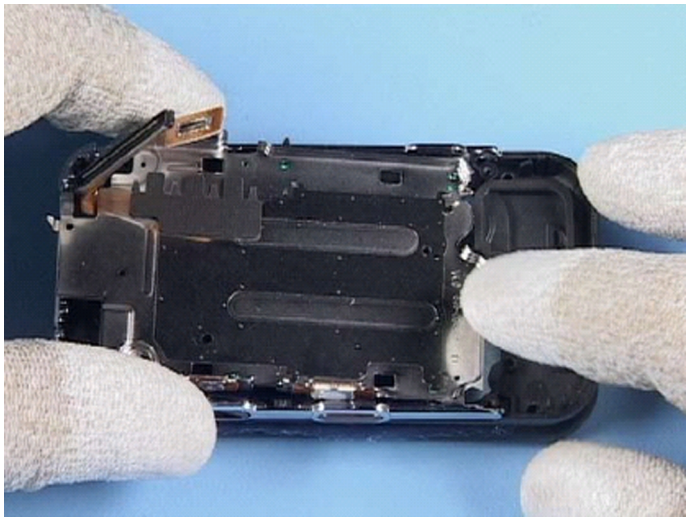
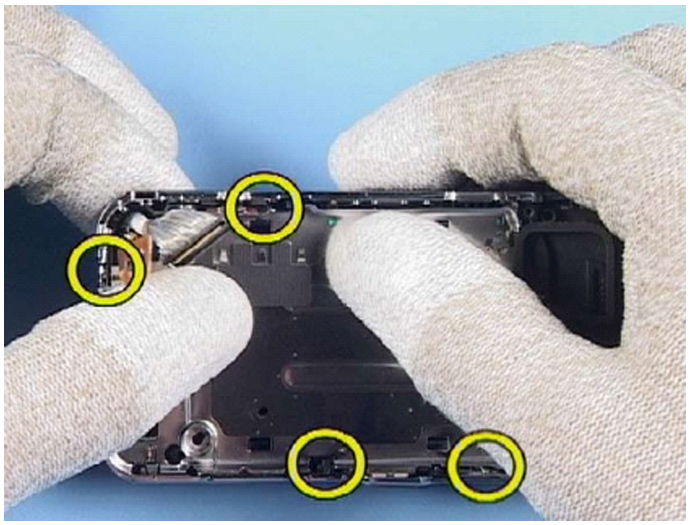
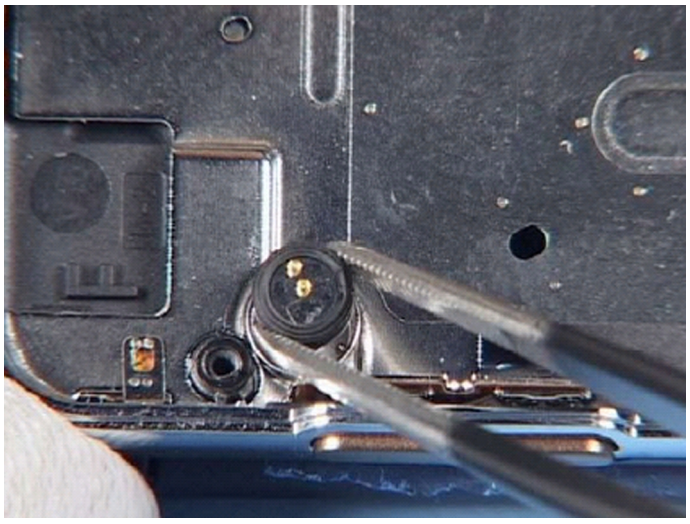
2. Place the LOWER C-COVER into the LOWER A-COVER beginning on the lower side.



3. Secure the LOWER C-COVER ASSY by pressing it into its position.



4. Insert the MICROPHONE avoiding to bend the spring contacts.



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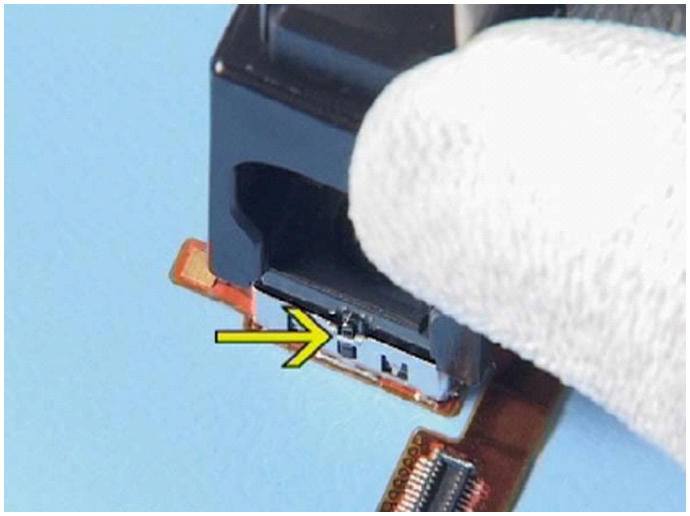
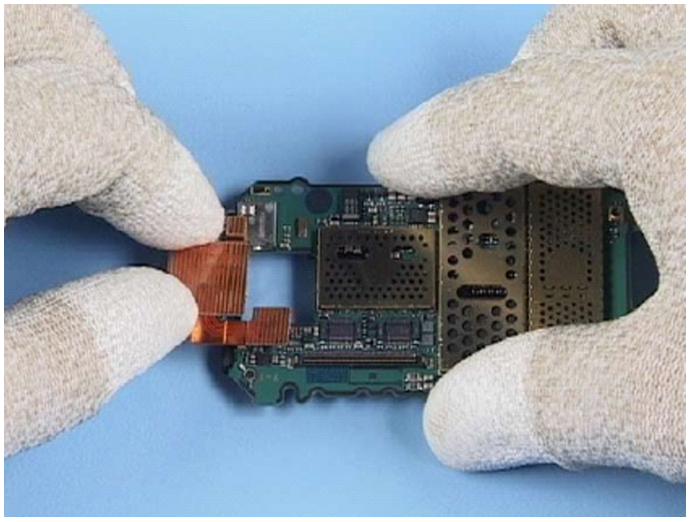
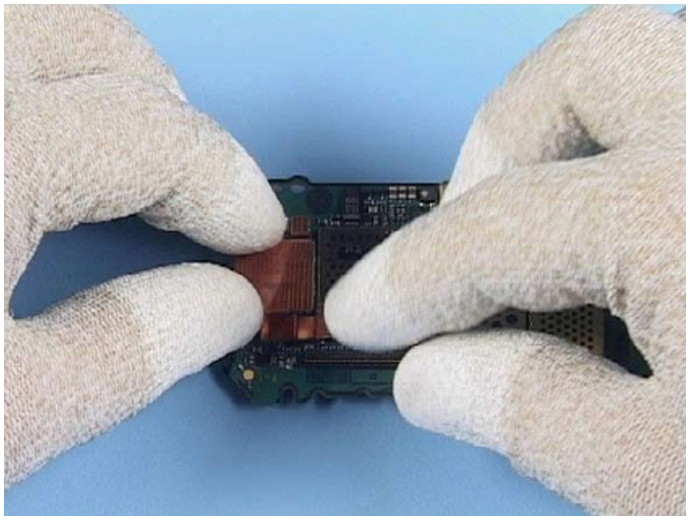
5. Insert the MAIN CAMERA into its socket paying attention to the right position of the guide.



6. Append the MAIN CAMERA assembly to the PWB.



7. Close the MAIN CAMERA connector.



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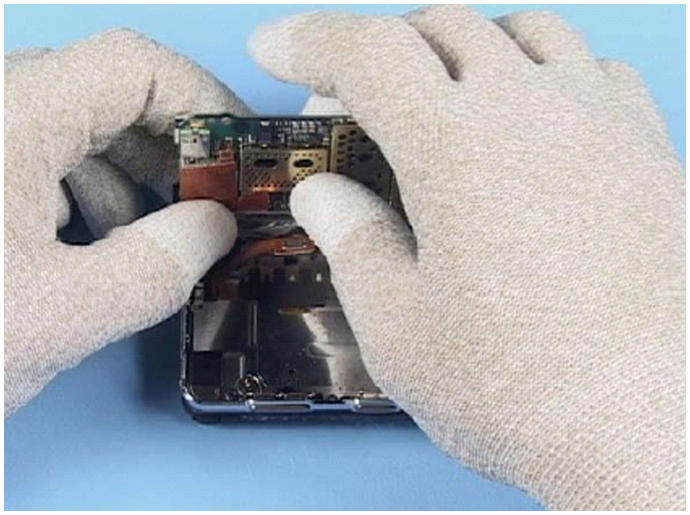
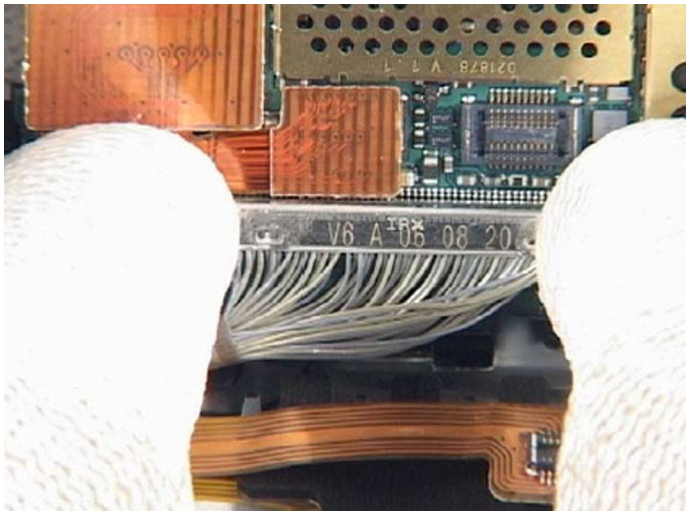
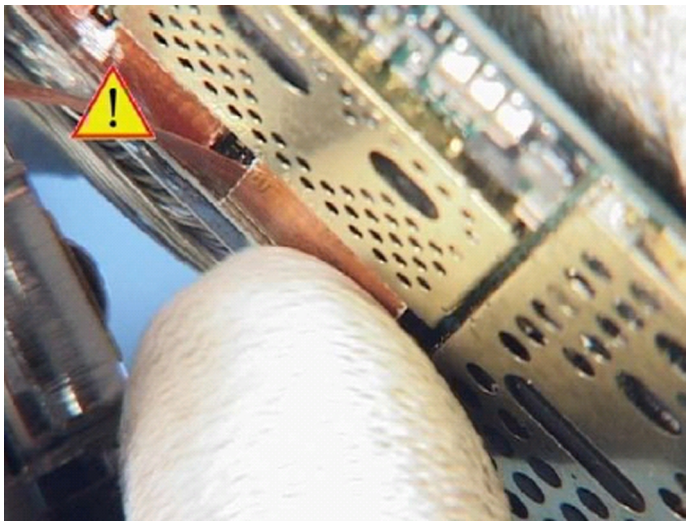
8. Lift up the PWB and hold it as shown...



9. Align the COAX CONNECTOR with the PWB CONNECTOR and close it carefully.



10. Connect the LOWER FLEX CONNECTOR to the PWB. Avoid to strain at the cords.



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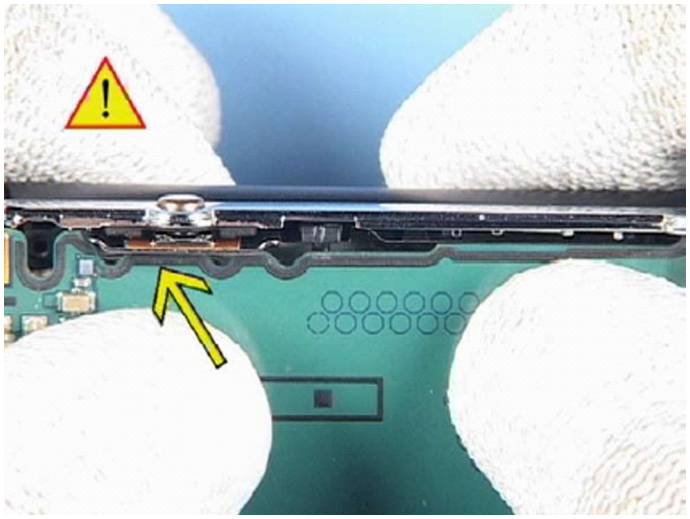
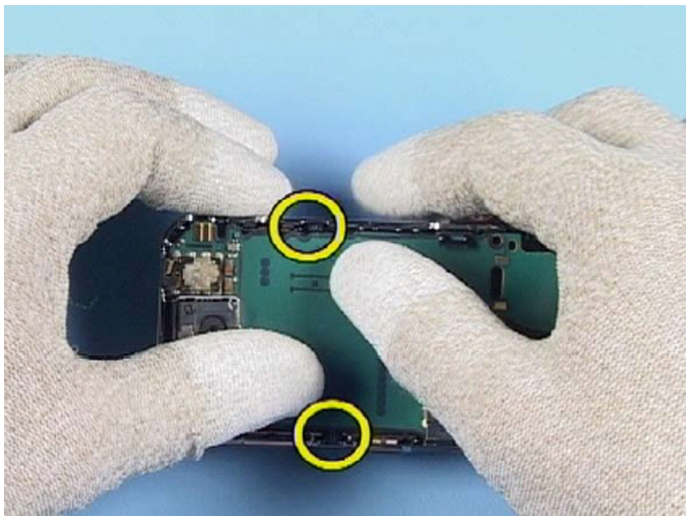
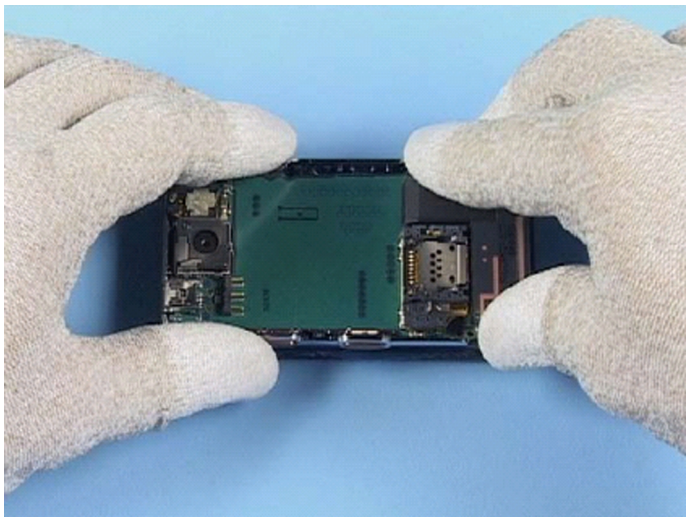
11. Be sure that the cords are not squeezed.



12. Now, secure the PWB into its position.



13. Fit the ANTENNA ASSY.



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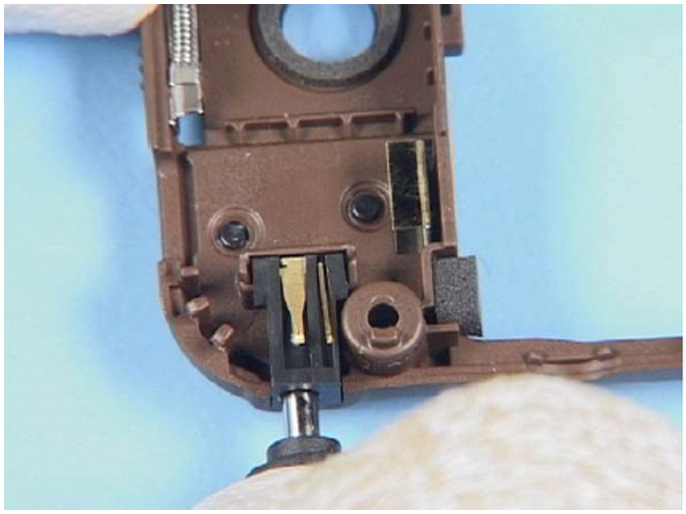
14. Insert the DC-Jack paying attention to the spring contacts.



15. Align the LOWER B-COVER with the LOWER A-COVER...

16. ... and gently press the covers together.

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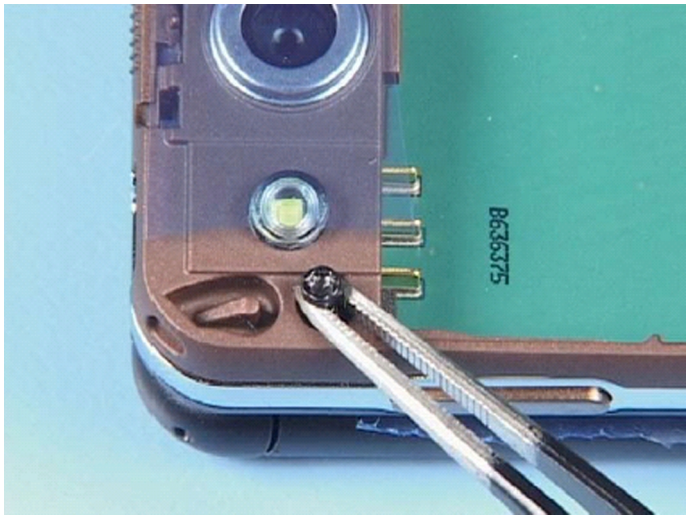
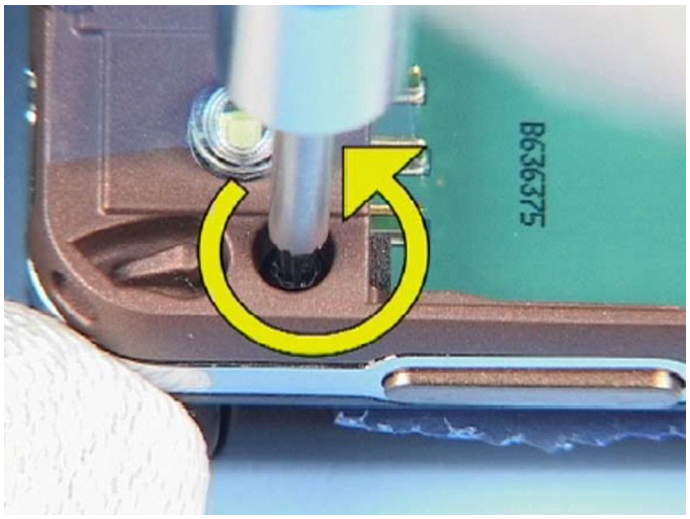
17. Insert the screws.



18. Set the torque driver to the torque of 20 Newton centimeter.

19. To avoid damaging the threads first turn the screws slightly left to engage the threads and then tighten them lightly.



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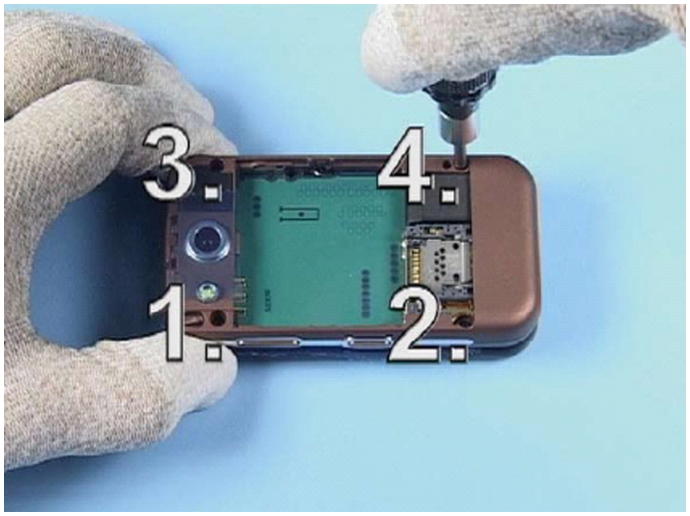
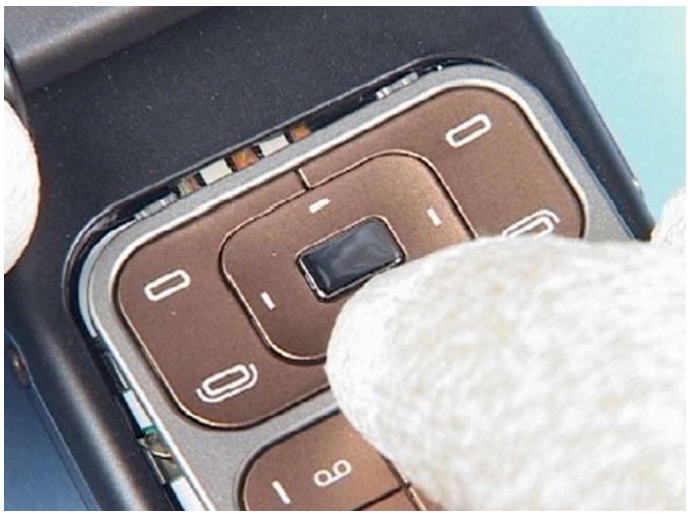
20. Tighten the screws to the correct torque in the order shown.



21. Fit the BATTERY COVER.

22. Place the KEYMAT onto the LOWER A-COVER...



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23. ...and secure it into its position.

24. Using a new A-COVER ASSY fit the new BUMPER.

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Hinge disassembly instruction

Steps

1. Release the glued Grounding Support with the SS-93.

2. Remove the Grounding Support.

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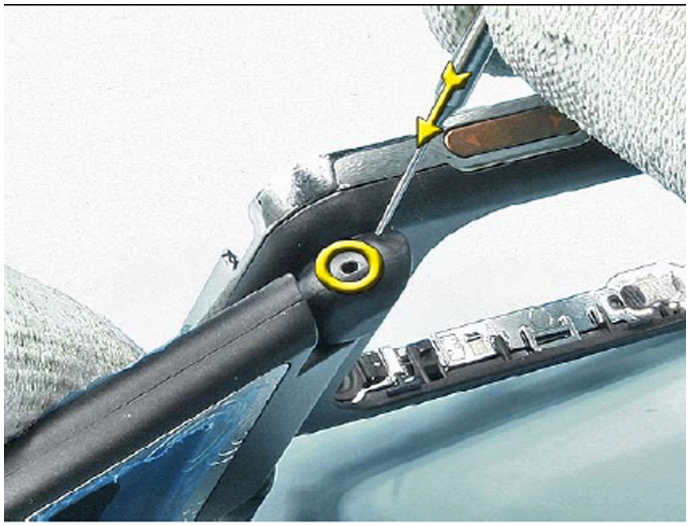
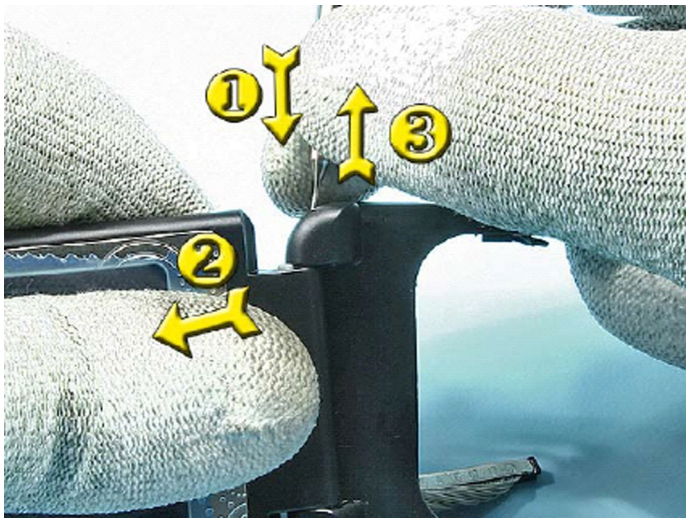
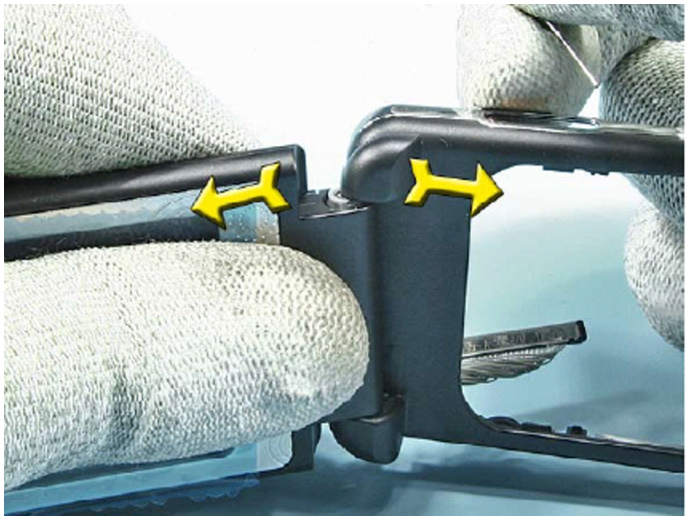
3. Stick the SS-6 in the hole.



4. First stick in, then move the upper part in the direction shown and remove the SS-6.



5. Move the Upper and the Lower part in opposite directions.



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6. Separate both parts.

7. Fit the Coax connector to the hole.

8. The disassembly is now complete.

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6 — BB Troubleshooting and Manual Tuning Guide

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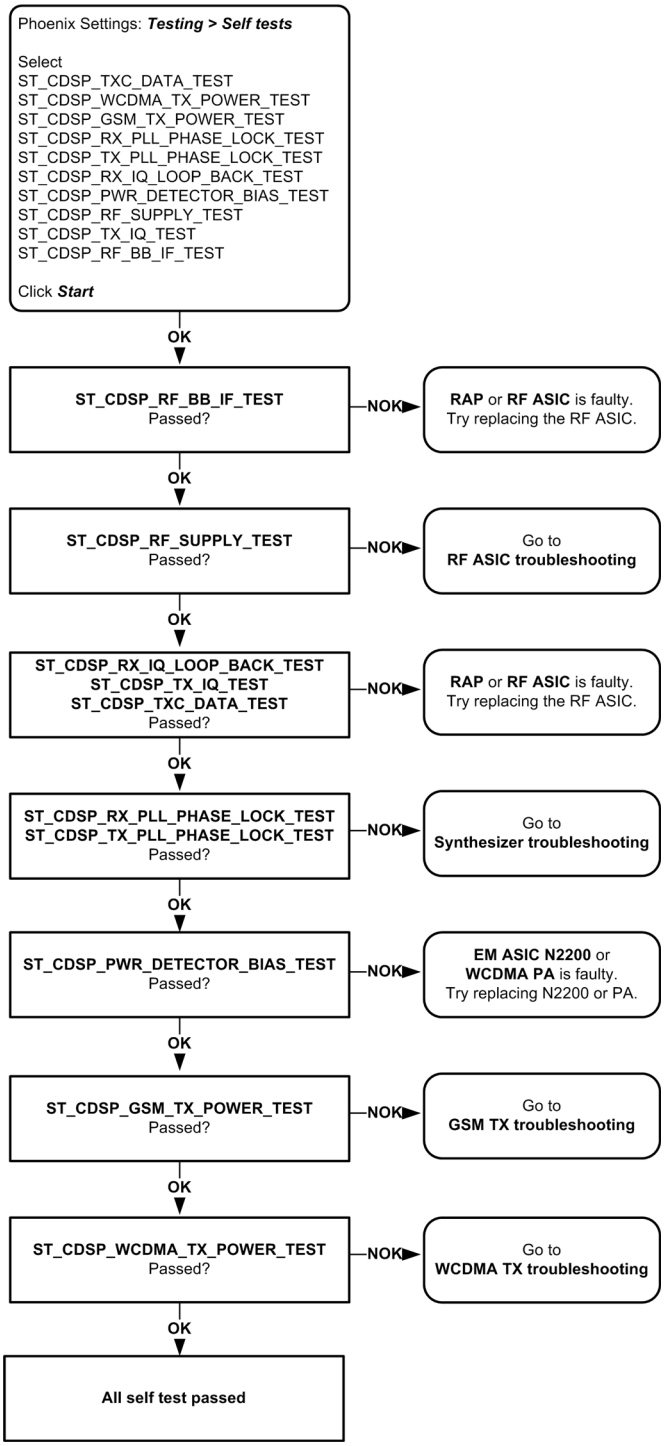
Phoenix self tests

Context

Always start the troubleshooting procedure by running the Phoenix self tests. If a test fails, please follow the diagram below.

If the phone is dead and you cannot perform the self tests, go to *Dead or jammed device troubleshooting.*

Troubleshooting flow



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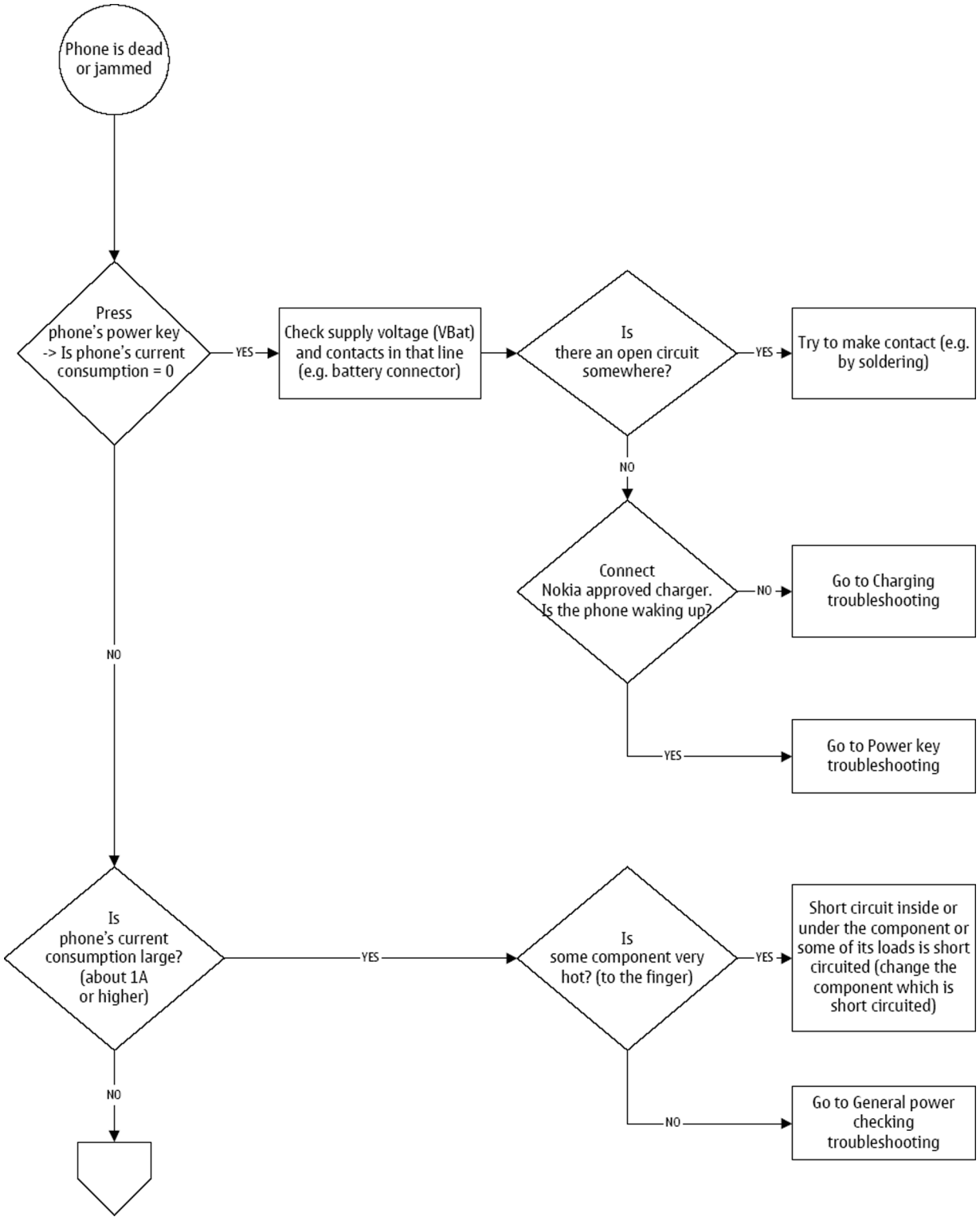
Power and charging troubleshooting

Dead or jammed device troubleshooting

Troubleshooting flow



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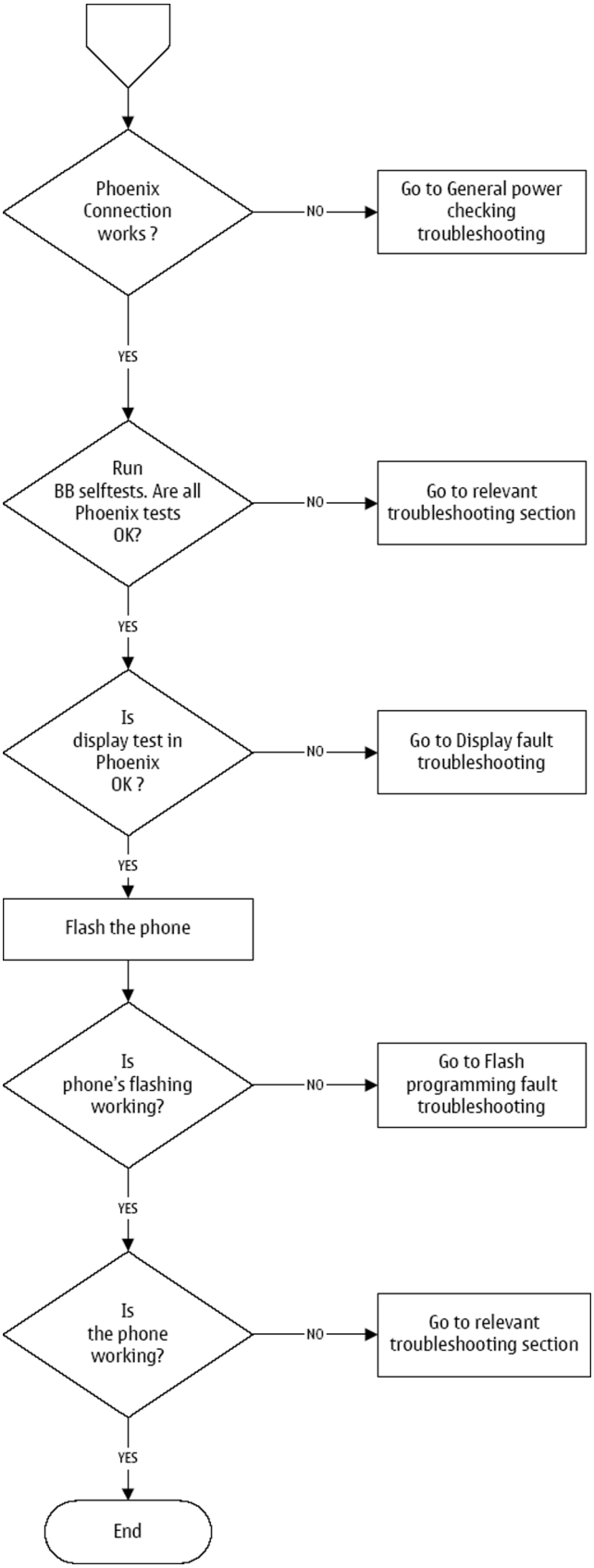

General power checking

Check the following voltages:

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Signal Rename	Regulator	Sleep	Idle	Nominal voltage	Main user	Notes
VIO	AVILMA	ON	ON	1.82	Memory, I/Os, IrDA, Display	
VBACK	AVILMA	ON	ON	2.5	Back-up battery	
VSIM1	AVILMA	ON	ON	1.8/3.0	SIM card	
VSIM2	AVILMA	OFF	OFF	1.8/3.0	Keyboard backlight	EL-foil driver
VDRAM	AVILMA	ON	ON	1.82	SDRAM	
VAUX	AVILMA	OFF	OFF	2.5	IrDA	IrDA active
VANA	AVILMA	ON	ON	2.5	Audio, some pull-ups	
VR1	AVILMA	OFF	ON	2.5	Crystal oscillators	
VRFC	AVILMA	OFF	ON	1.8	RAP3G converters	
VRCP1	AVILMA			4.75	To RF parts	RF active
VREF	AVILMA	ON	ON	1.35	RF reference	
VCORE	BETTY	ON	ON	1.05 1.25 1.35 1.40	RAP3G digital	
VOUT	BETTY	OFF	OFF	2.5		Accessory connected
VCAM_2V8	LP3987ITLX-2.85/N1060	OFF	OFF	2.850	Camera	Disabled in sleep
VCAM_1V8	LM3671TLX-1.82/N1080	OFF	OFF	1.800	Camera	Disabled in sleep
VCAM_1V5	TPS62311YZDR/N1050	OFF	OFF	1.570	Camera	Disabled in sleep
2V8_FM_LCD	LP3985ITLX-2.85/N6050	ON	ON	2.850	FM, LCD, Hall sensor	Only turned off in "Power off" mode
VMMC	LP3928TLX-1828/N3200	OFF	OFF	2.850	MCC card	Disabled in sleep
LCD_LED_OUT	4w_LED_DRIVER	OFF	OFF	14.5	LCD Backlight	Disabled in sleep

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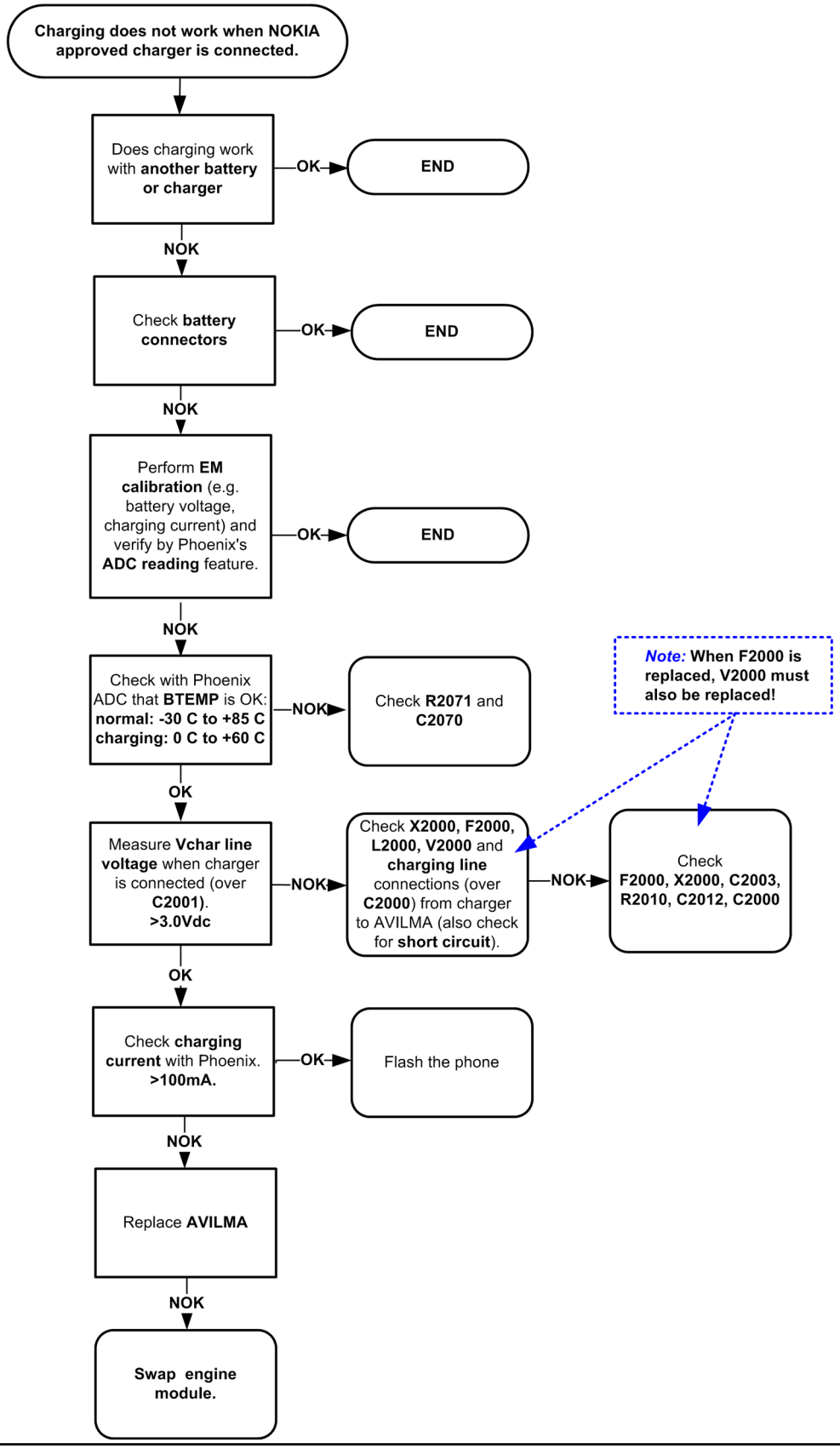
Charging troubleshooting

Troubleshooting flow



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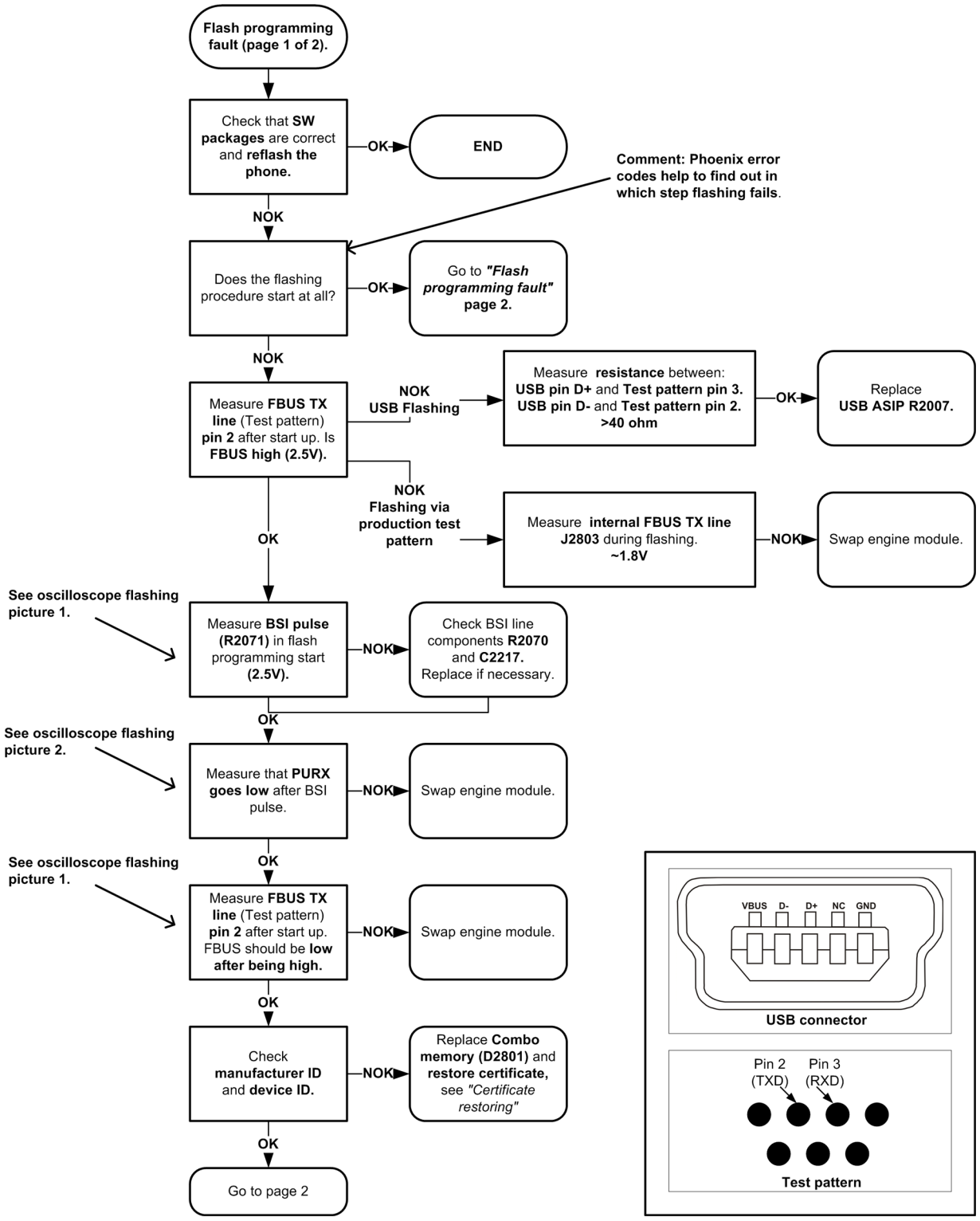
Interface troubleshooting

Flash programming fault troubleshooting

Part 1



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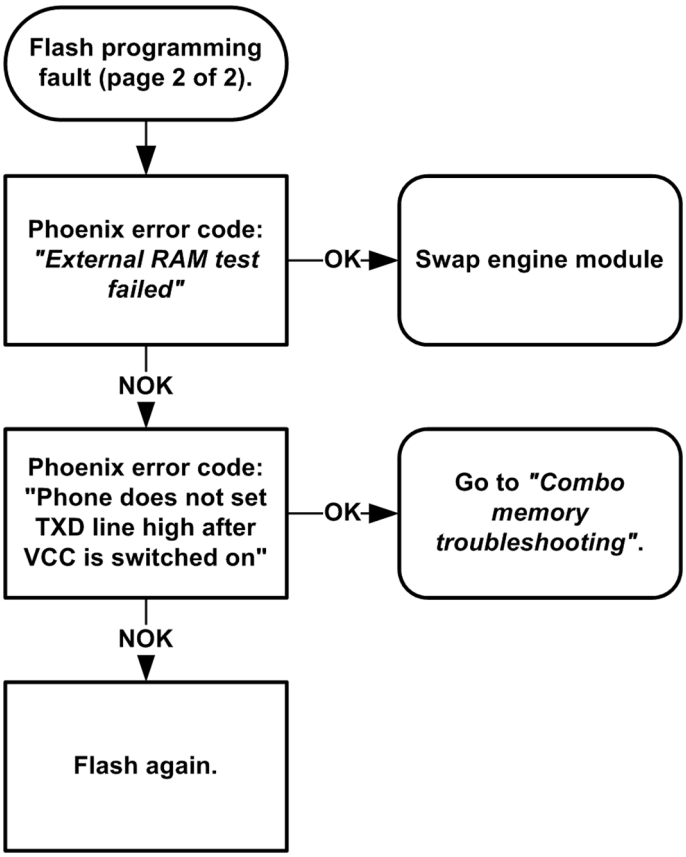
Part 2



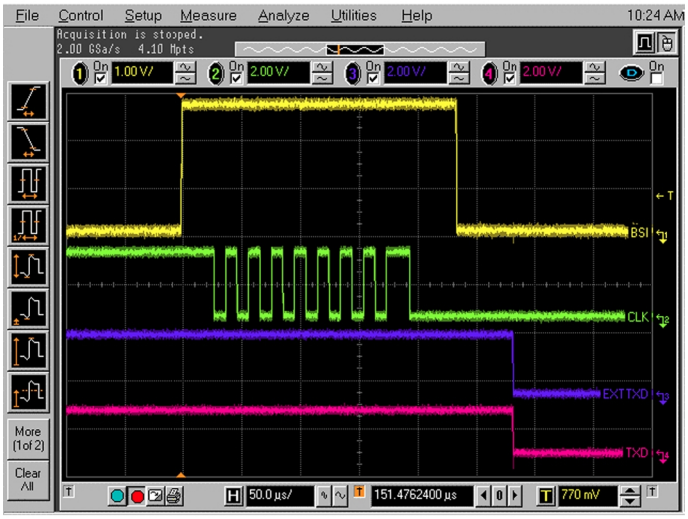


Figure 39 Flashing pic 1. Take single trig measurement for the rise of the BSI signal.

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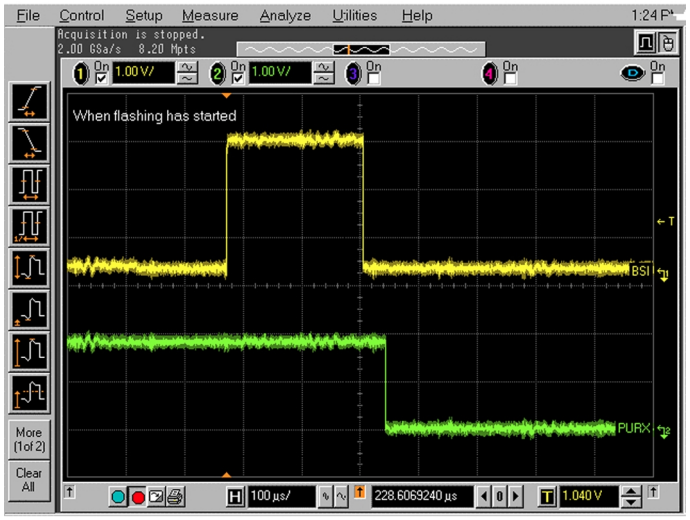
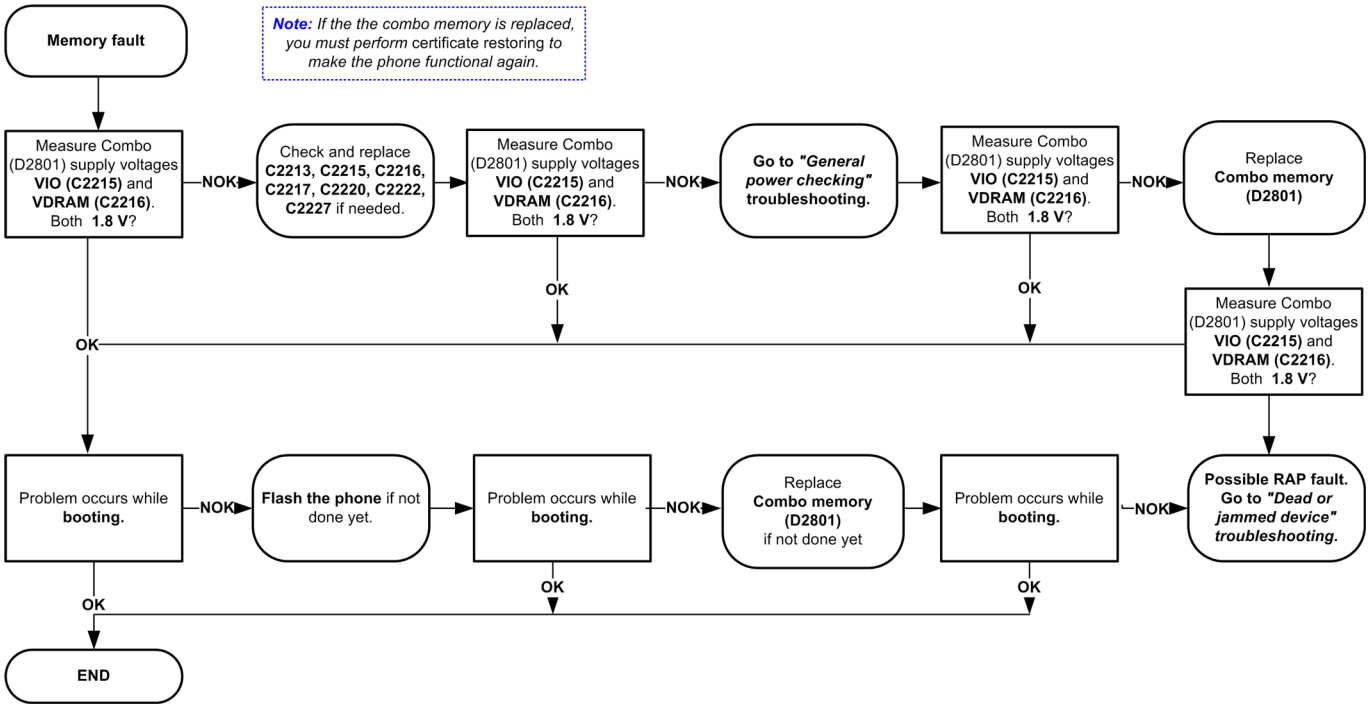


Figure 40 Flashing pic 2. Take single trig measurement for the rise of the BSI signal.

Combo memory troubleshooting

Troubleshooting flow



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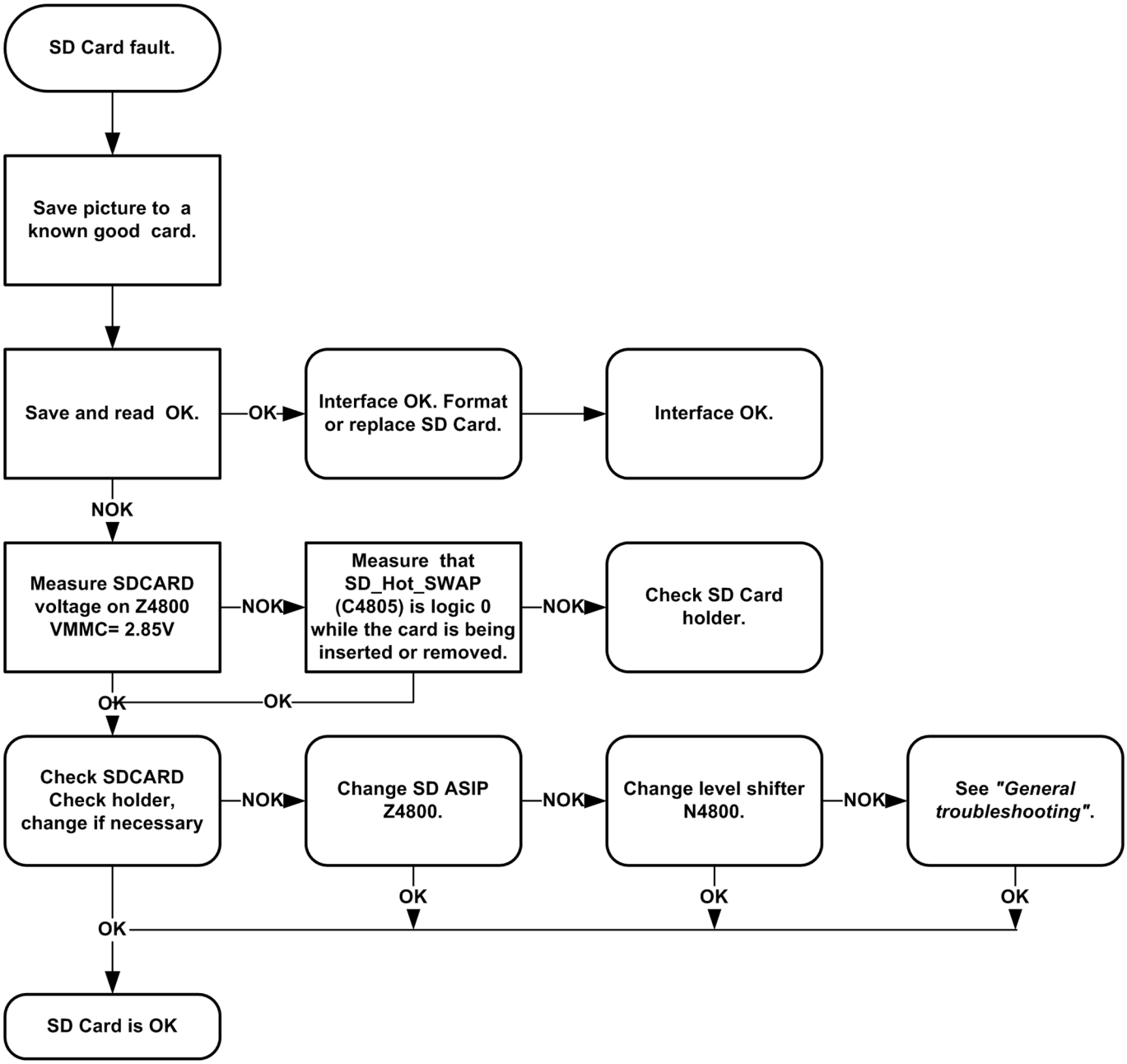
SD card troubleshooting

Troubleshooting flow



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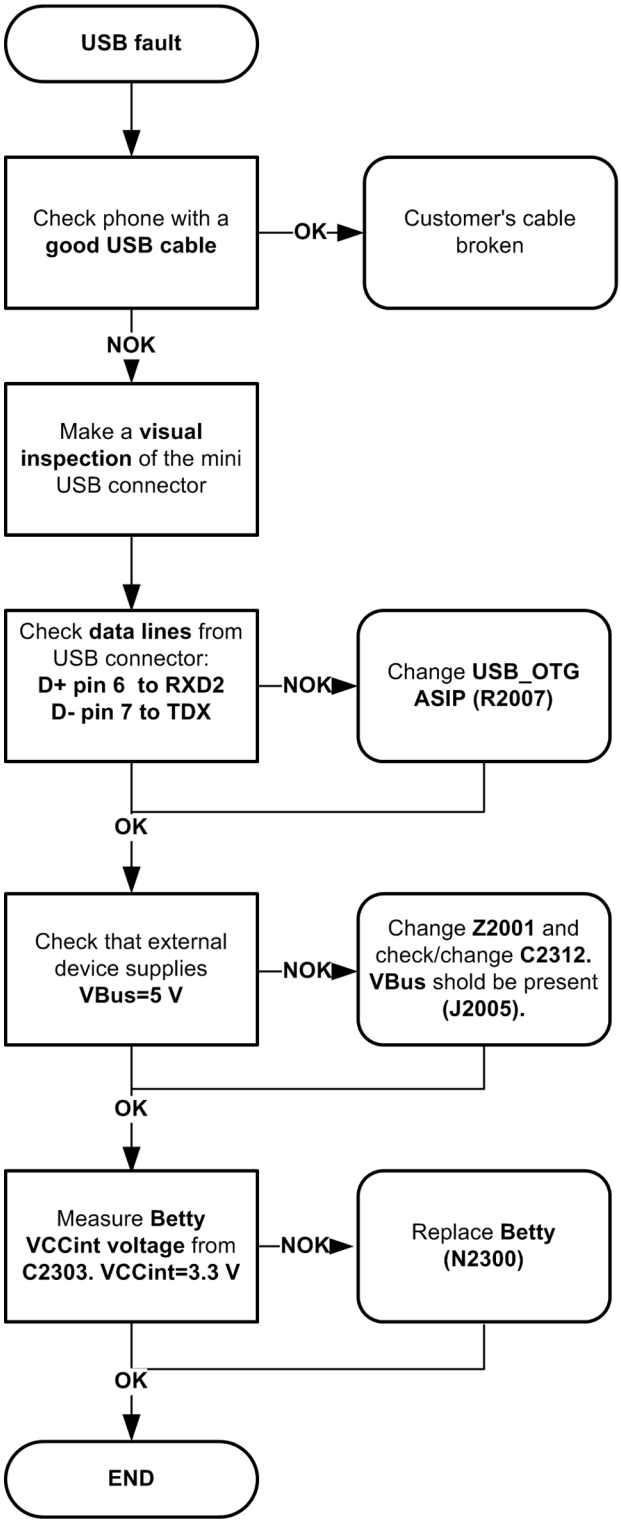
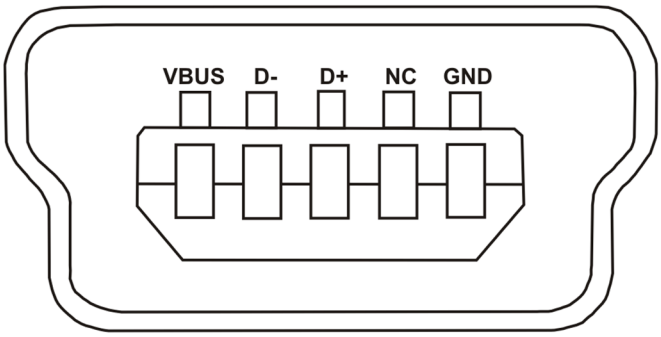
USB interface troubleshooting

Troubleshooting flow





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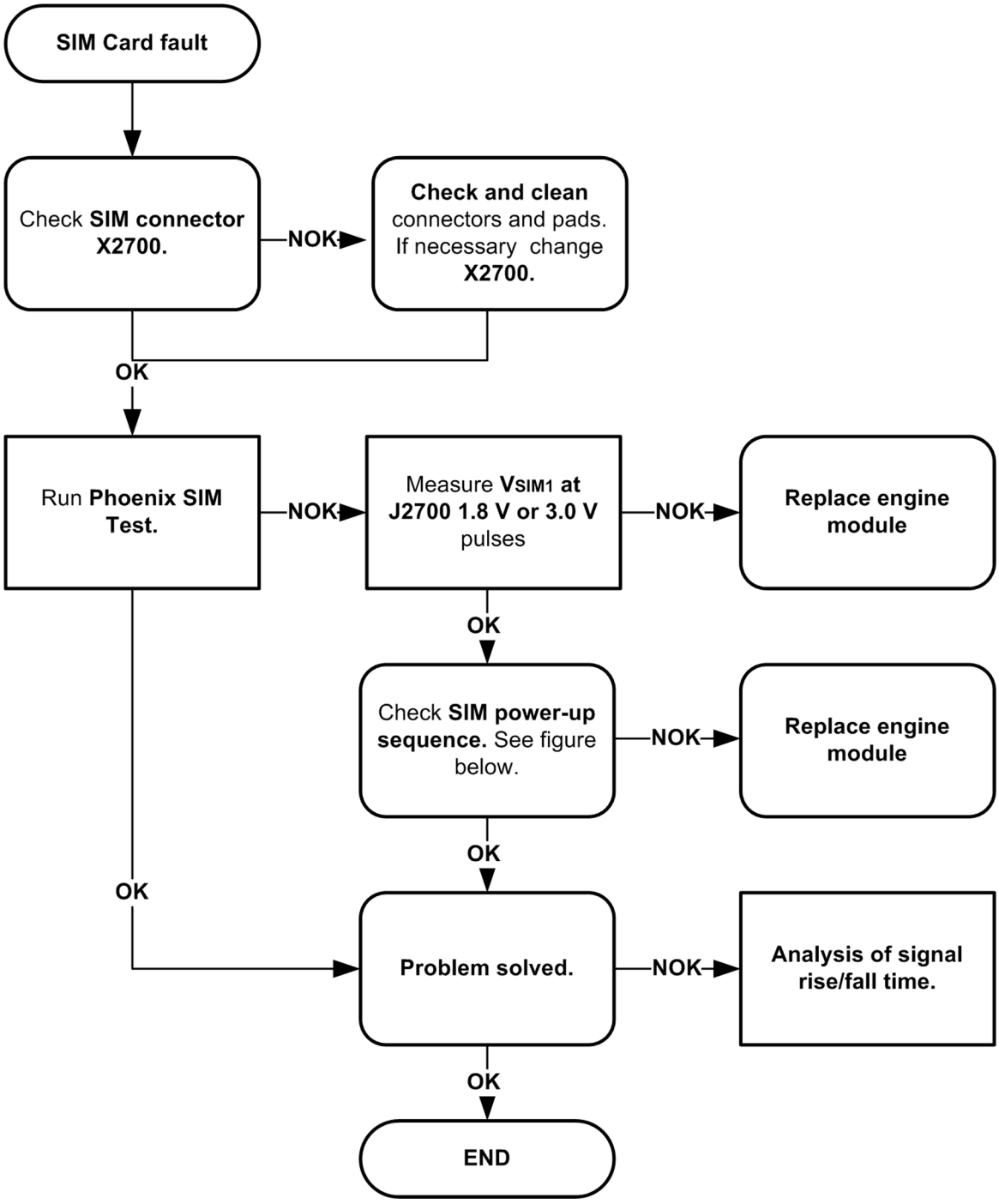
SIM card troubleshooting

Troubleshooting flow



User interface troubleshooting

Keypad, side and media keys troubleshooting

Context

There are two possible failure modes in the keyboard module:

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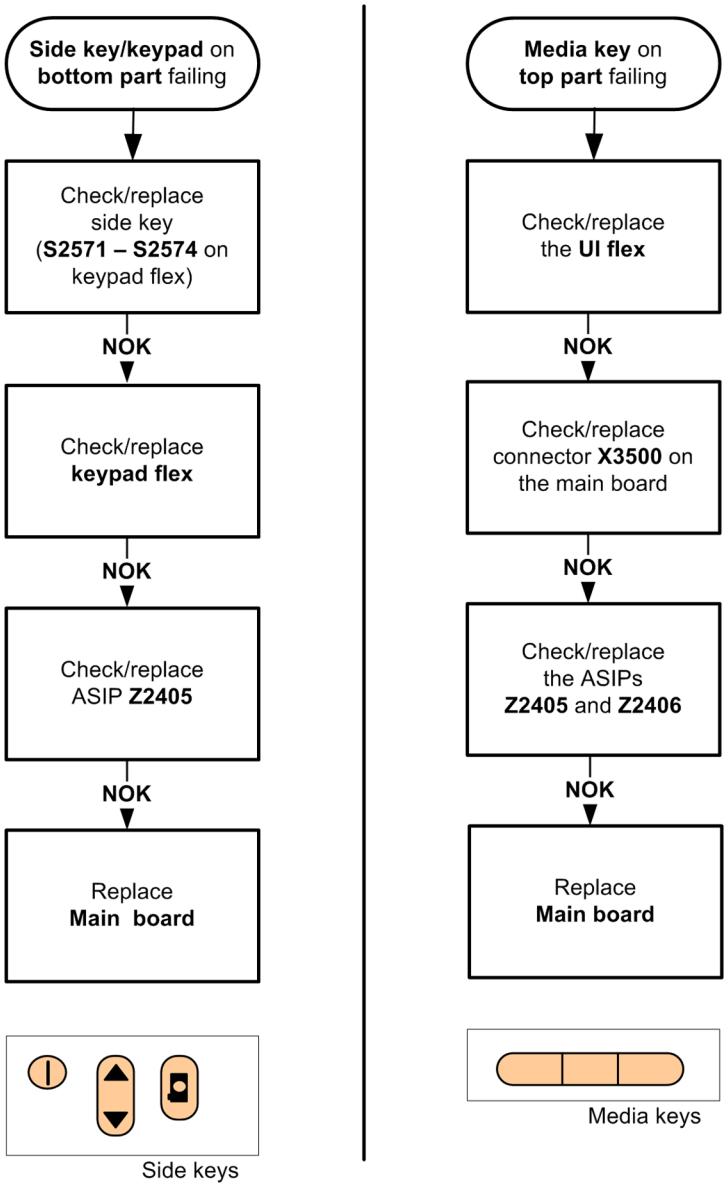
- One or more keys are stuck, so that the key does not react when a keydome or a side key is pressed. This kind of failure is caused by mechanical reasons (dirt, rust, mechanical damage, etc.)
- Malfunction of several keys at the same time; this happens when one or more rows or columns in the key matrix are failing (shortcut or open connection).

If the failure mode is not clear, start with the Keyboard test in Phoenix.

Troubleshooting flow



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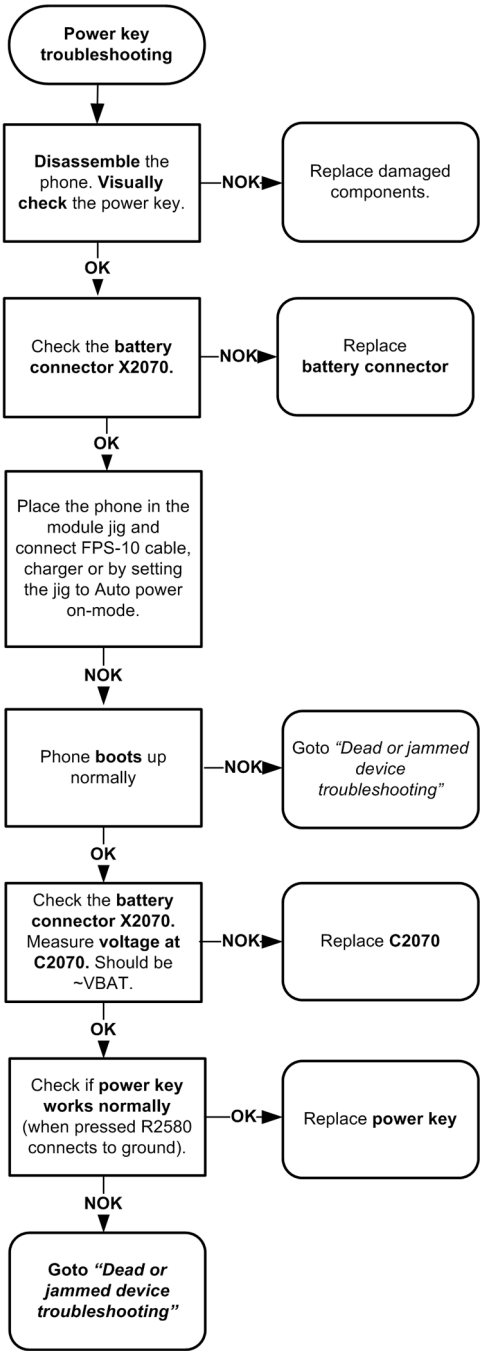
Power key troubleshooting

Troubleshooting flow



Display module troubleshooting

General instructions for display troubleshooting

Context

- The display is in a normal mode when the phone is in active use.
- Display is in a partial idle mode when the phone is in the screen saver mode.

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- The operating modes of the display can be controlled with the help of *Phoenix*.

Table 9 Display module troubleshooting cases

Display blank	There is no image on the display. The display looks the same when the phone is on as it does when the phone is off. The backlight can be on in some cases.
Image on the display not correct	Image on the display can be corrupted or a part of the image can be missing. If a part of the image is missing, change the display module. If the image is otherwise corrupted, follow the appropriate troubleshooting diagram.
Backlight dim or not working at all	Backlight LED components are inside the display module. Backlight failure can also be in the connector or in the backlight power source in the main engine of the phone. This means that in case the display is working (image OK), the backlight is faulty.
Visual defects (pixel)	Pixel defects can be checked by controlling the display with Phoenix. Use both colours, black and white, on a full screen. The display may have some random pixel defects that are acceptable for this type of display. The criteria when pixel defects are regarded as a display failure, resulting in a replacement of the display, are presented the following table.

Table 10 Pixel defects

<table>
<tr><th>Item</th><th></th><th colspan="4">White dot defect</th><th>Black dot defect</th><th>Total</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Defect counts</td><td>R</td><td>G</td><td>B</td><td>White Dot Total</td><td rowspan="2">1</td><td rowspan="2">1</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>2</td><td>Combined defect counts</td><td colspan="6">Not allowed.
Two single dot defects that are within 5 mm of each other should be interpreted as combined dot defect.</td></tr>
</table>

Steps

1. Verify with a working display that the fault is not on the display module itself.
   The display module cannot be repaired.
2. Check that the cellular engine is working normally.
   i To check the functionality, connect the phone to a docking station.
   ii Start *Phoenix* service software.
   iii Read the phone information to check that also the application engine is functioning normally (you should be able to read the APE ID).

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3. Proceed to the display troubleshooting flowcharts.
   Use the **Display Test** tool in *Phoenix* to find the detailed fault mode.

Display troubleshooting

Context

There are three different display fault cases;

1 No backlights when image is on

2 No image when backlight is on

3 No backlight and no image

> **Note:** When assembling/disassembling the phone, all grounding contacts between different levels (display, display flex, display frame, coaxial connector) must be checked in order to have them properly connected.

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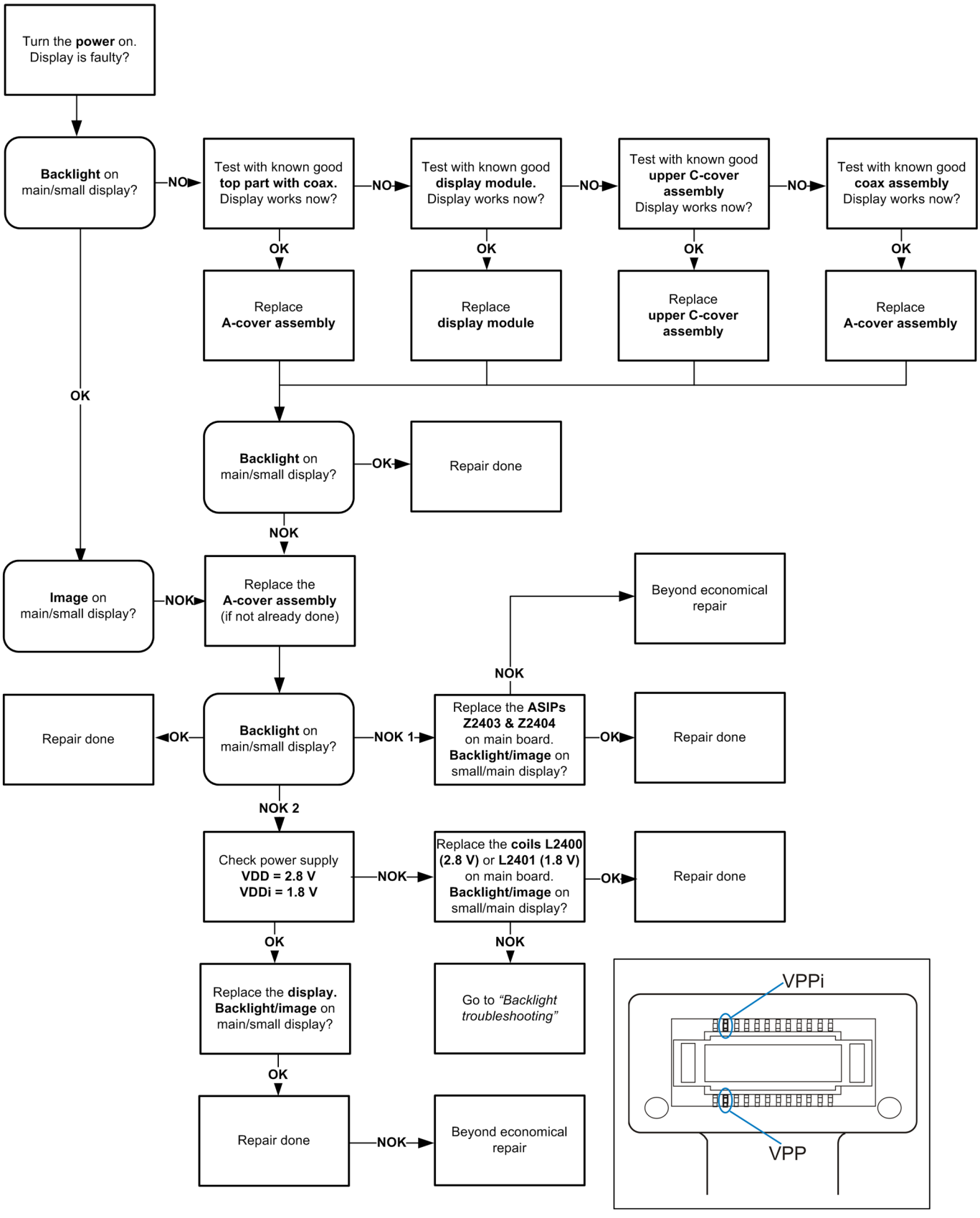
Troubleshooting flow



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Display and keyboard backlight troubleshooting

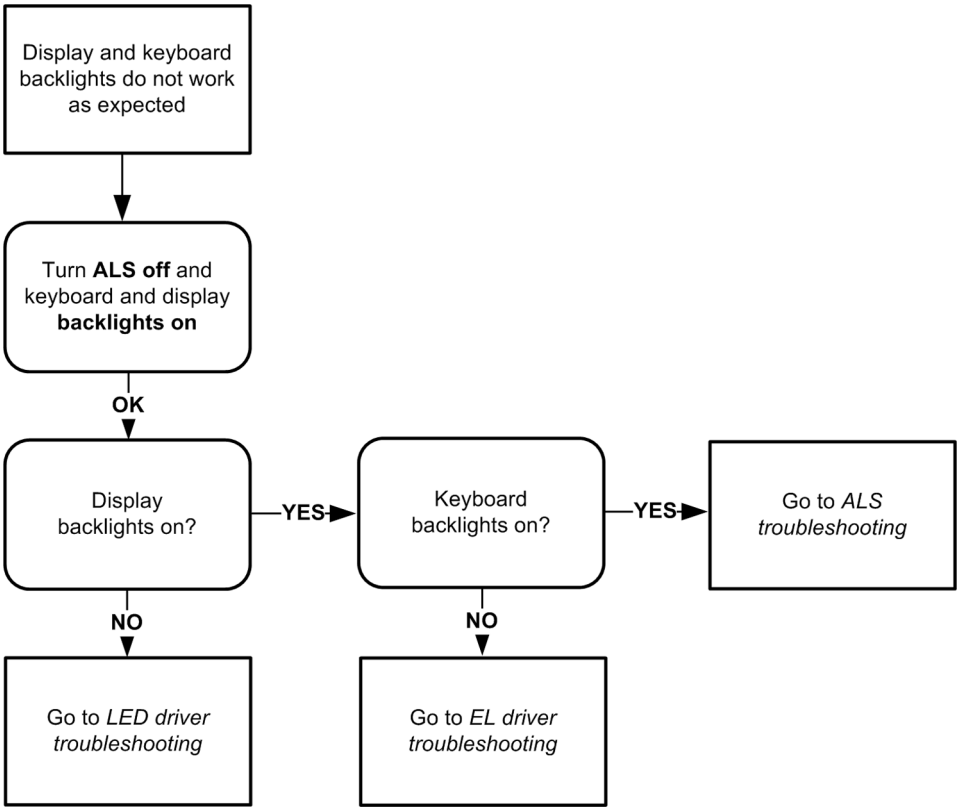
Context

The device has one LED driver that provides current for display and an Electroluminescent (EL) driver for the keyboard EL-foil.

Keyboard light is turned on only in dark conditions. This is controlled by the Ambient Light Sensor (ALS). Also the brightness of the display is adjusted by the ambient light sensor.

You can enable/disable ALS with the help of Phoenix service software, by turning backlight or keyboard light on/off. ALS is enabled again by pressing any key on the device.

Troubleshooting flow



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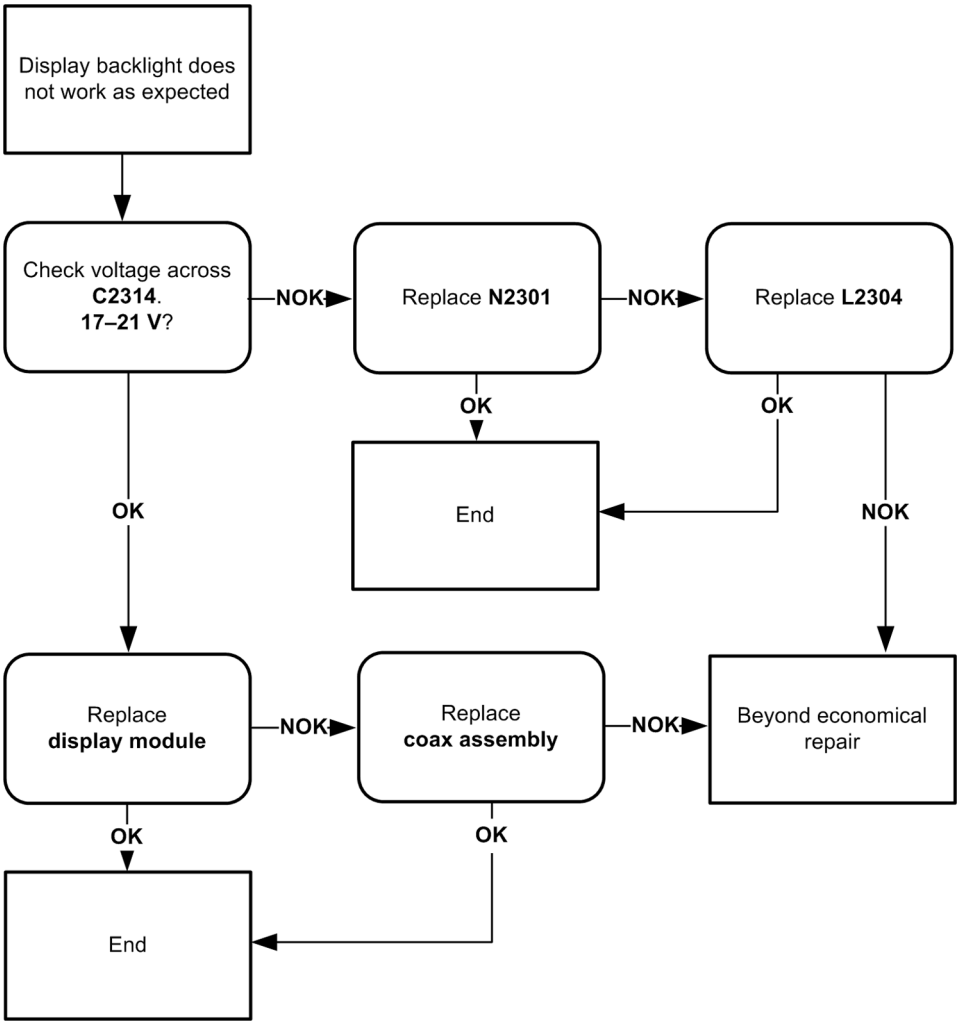
LED driver troubleshooting

Troubleshooting flow



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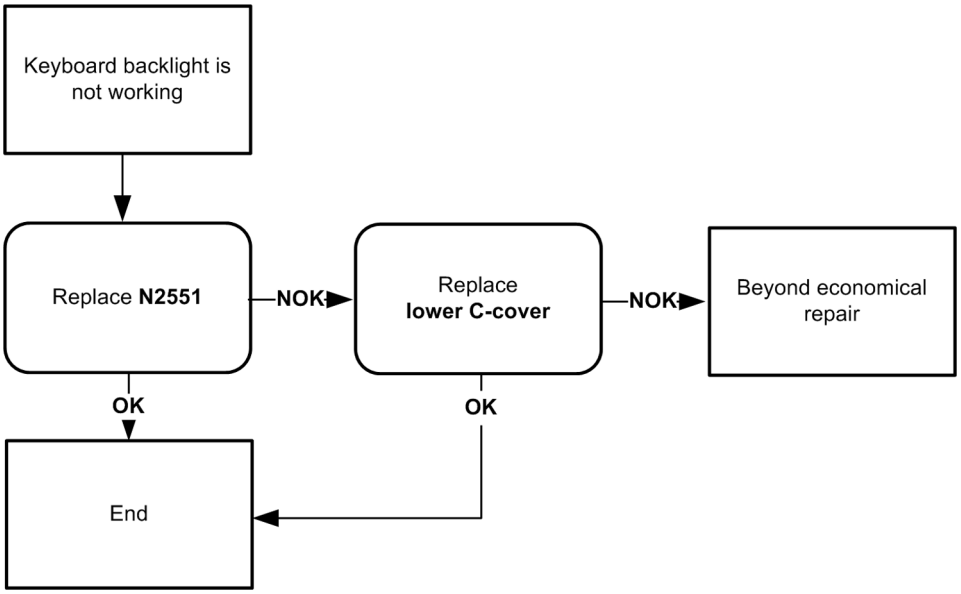
EL driver troubleshooting

Troubleshooting flow



ALS troubleshooting

Prerequisites

Make sure that you have completed the *Display and keyboard backlight troubleshooting* before continuing with the ALS troubleshooting.

Context

If a photoresistor is broken, replace it with a typical phototransistor. If the calibration values are lost (eg. after replacing the NOR memory chip) or if the phototransistor is replaced, the calibration value in the phone memory has to be changed to the default value; 1.

The troublehsooting diagram refers to this:

- Phoenix lights control tool can also yurn the lights on. The correct luminance in darkness is < 20 lx. In office environment 100-2000 lx. The luminance value depends strongly on the light source and the angle of the phone, so these values only give rough guidelines.
- Phoenix has an ambient light sensor calibration tool for changing calibration values.

The pull-up resistor calibration is done first:

1 Cover the light guide (in the top right corner, above the small/front camera), preferably with black tape.

2 Click **Start** and **Write**.

Ambient light sensor calibration:

1 Ensure that *Use default values only* flag is set

2 Click **Write**

Note: Tools are not available in Service centers for performing accurate manual calibration

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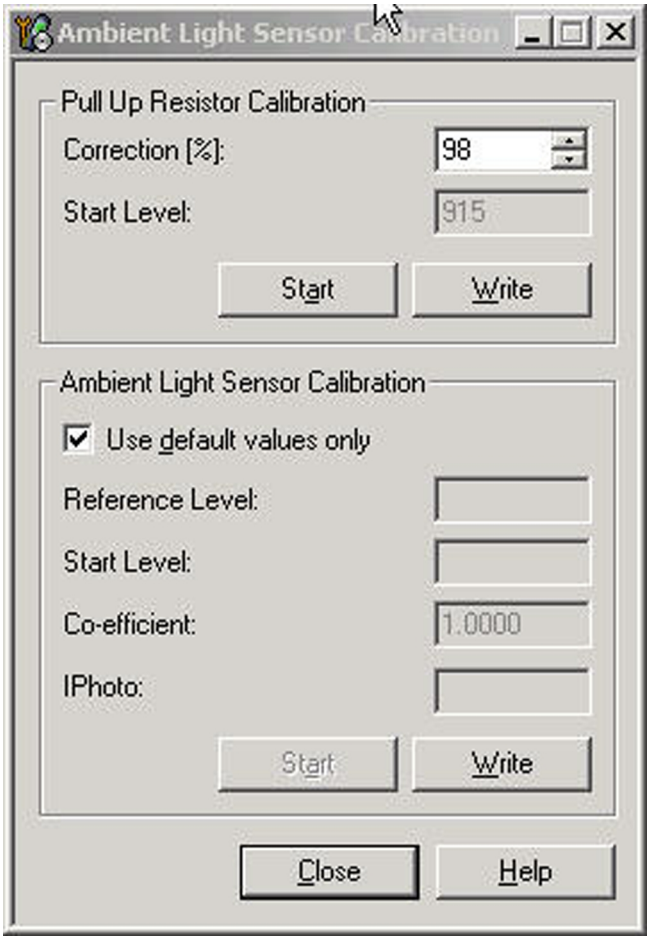

Figure 41 Ambient light sensor calibration window

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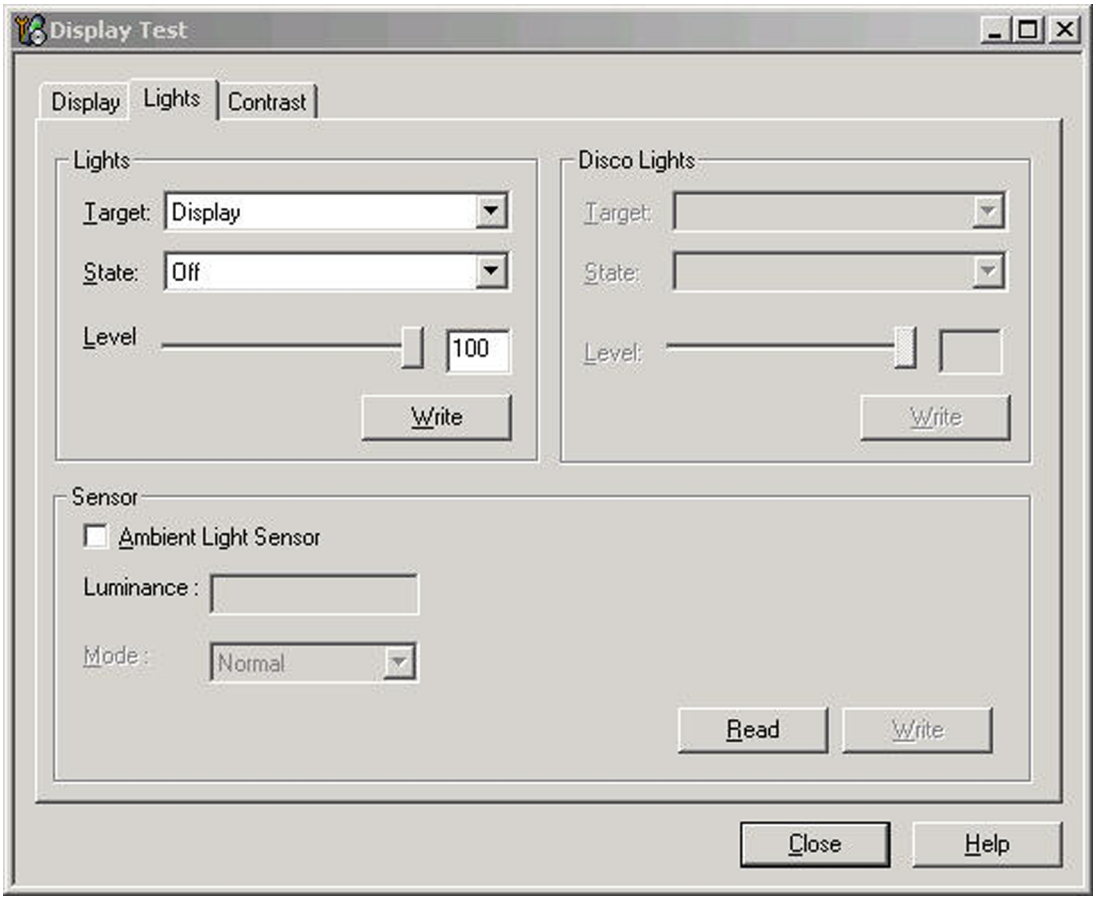

Figure 42 Display test

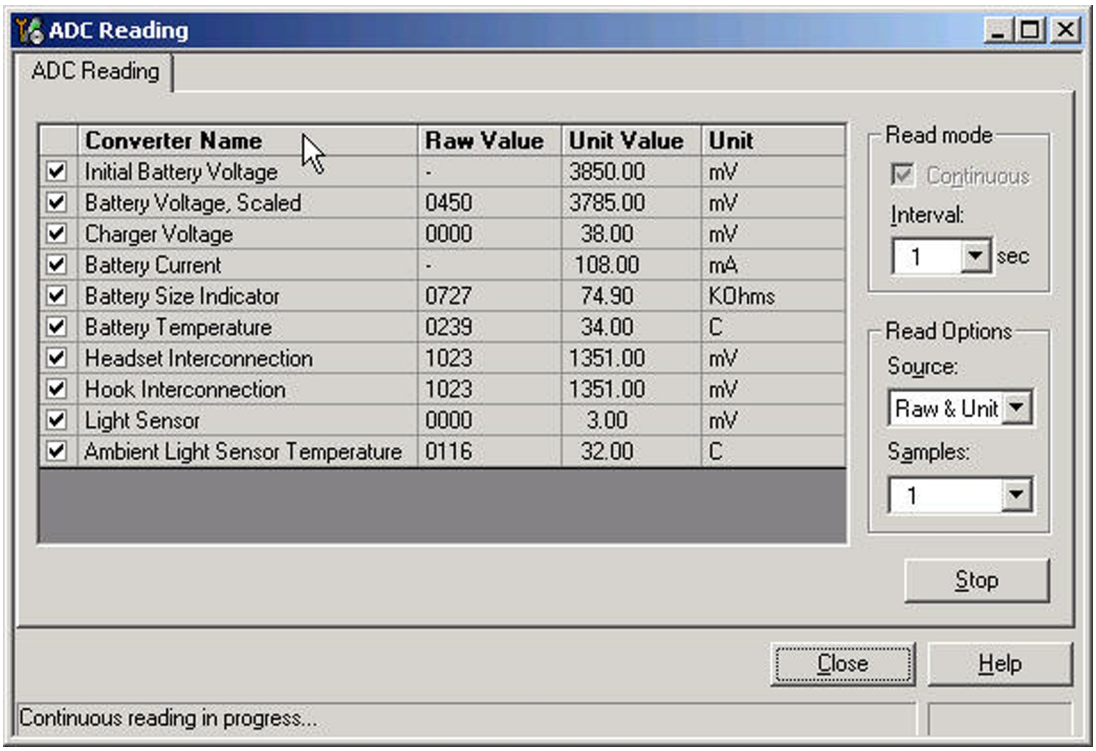

Figure 43 ADC readings

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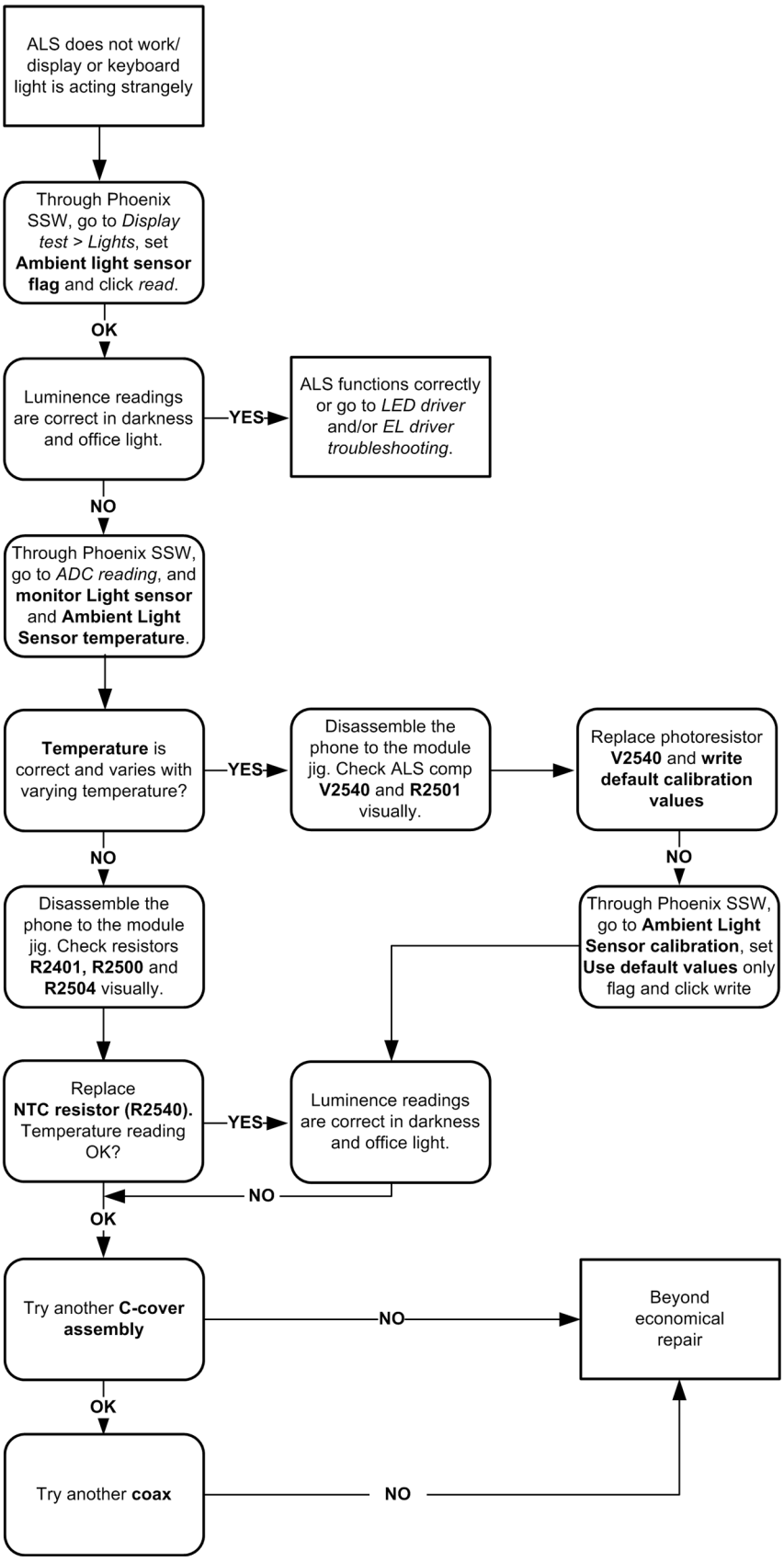
Troubleshooting flow



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Camera module troubleshooting

Introduction to camera troubleshooting

Bad conditions often cause bad pictures. Therefore, the camera operation has to be checked in constant conditions or by using a second, known-to-be-good Nokia device as reference. Image quality is hard to measure quantitatively, and the difference between a good and a bad picture can be small. Some training or experience may be needed to detect what is actually wrong.

When checking for possible errors in camera functionality, knowing what error is suspected significantly helps the testing by narrowing down the amount of test cases. The following types of image quality problems are common:

- Dust (black spots)
- Lack of sharpness
- Bit errors

Taking and evaluating test pictures with main camera

When *taking* a test picture, remember the following:

- Avoid bright fluorescent light, 50/60Hz electrical network or high artificial illumination levels
- If the phone is hot, let it rest for a while before taking the picture
- Make sure the optical system is clean
- Use highest possible resolution
- Make sure the light is suffiecient (bright office lightning)
- Do not take the picture towards light source
- Hold the phone as still as possible when taking the picture
- Distance should be at least 40cm, 1-2m is recommended

When *evaluating* a test picture, remember the following:

- The center of the picture is sharper than the edges
- The image may be blurred, though it does not show in the viewfinder
- Analyse the picture from your PC monitor, full colour setting is recommended
- If possible, compare with a picture of the same motive taken with a similar Nokia device

Evaluating videocall picture quality from small (front) camera

When testing the picture quality of a videocall, remember the following:

- Avoid bright fluorescent light, 50/60Hz electrical network or high artificial illumination levels
- Make sure the optical system is clean
- Make sure the light is suffiecient (bright office lightning)
- Do not take the picture towards light source
- Hold the phone as still as possible when evaluating the video call image quality.
- Distance should be approximately 40 cm

When *evaluating* the picture quality of a video call, remember the following:

> **Note:** Always use the "troubled" phone when evaluating a picture in a video call (top right corner of display). Do not evaluate the picture on the receiving phone.

- The center of the picture is sharper than the edges
- If possible, compare with the picture on another Nokia device in a videocall, and of the same motive.

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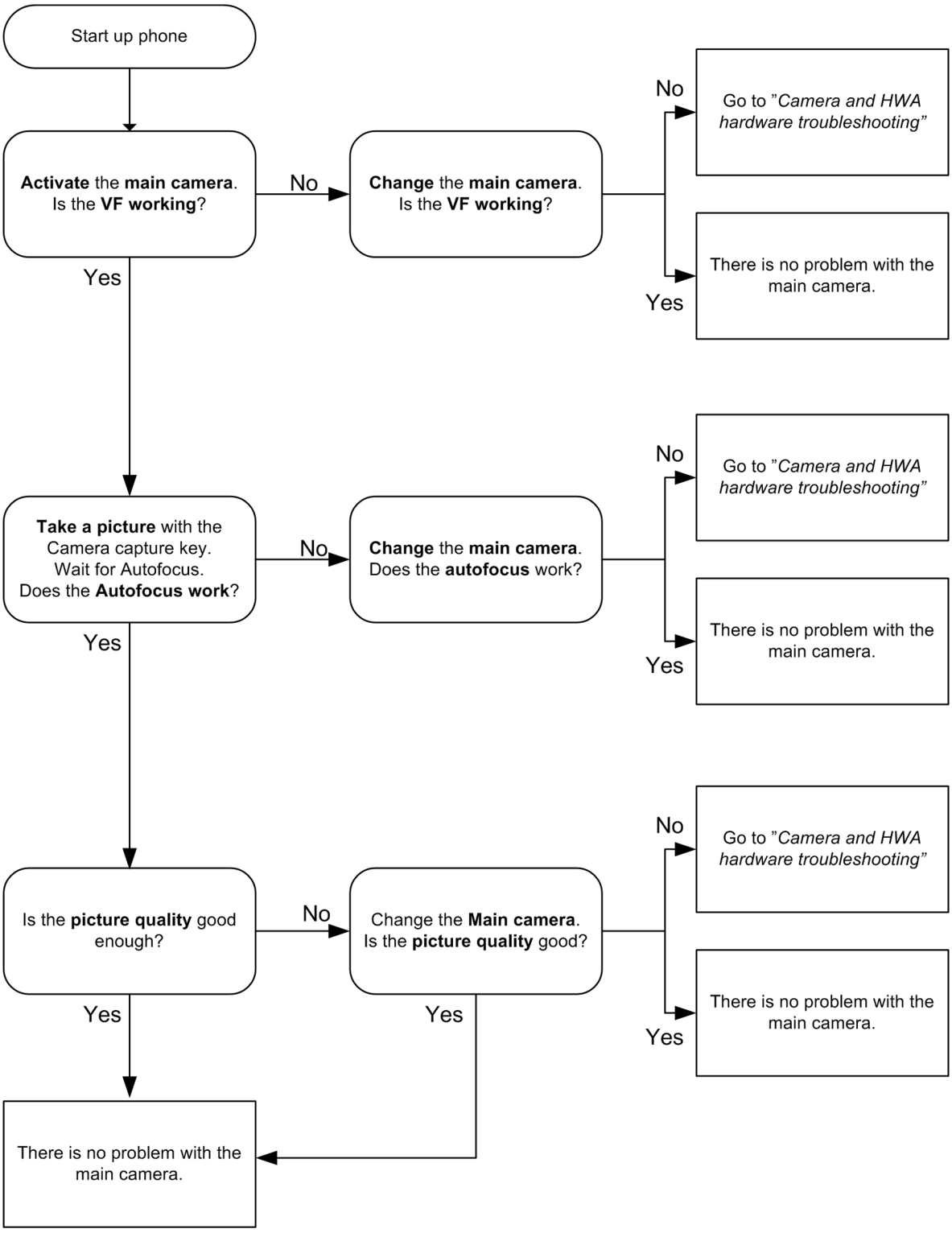
Main (back) camera troubleshooting

Camera troubleshooting

Troubleshooting flow



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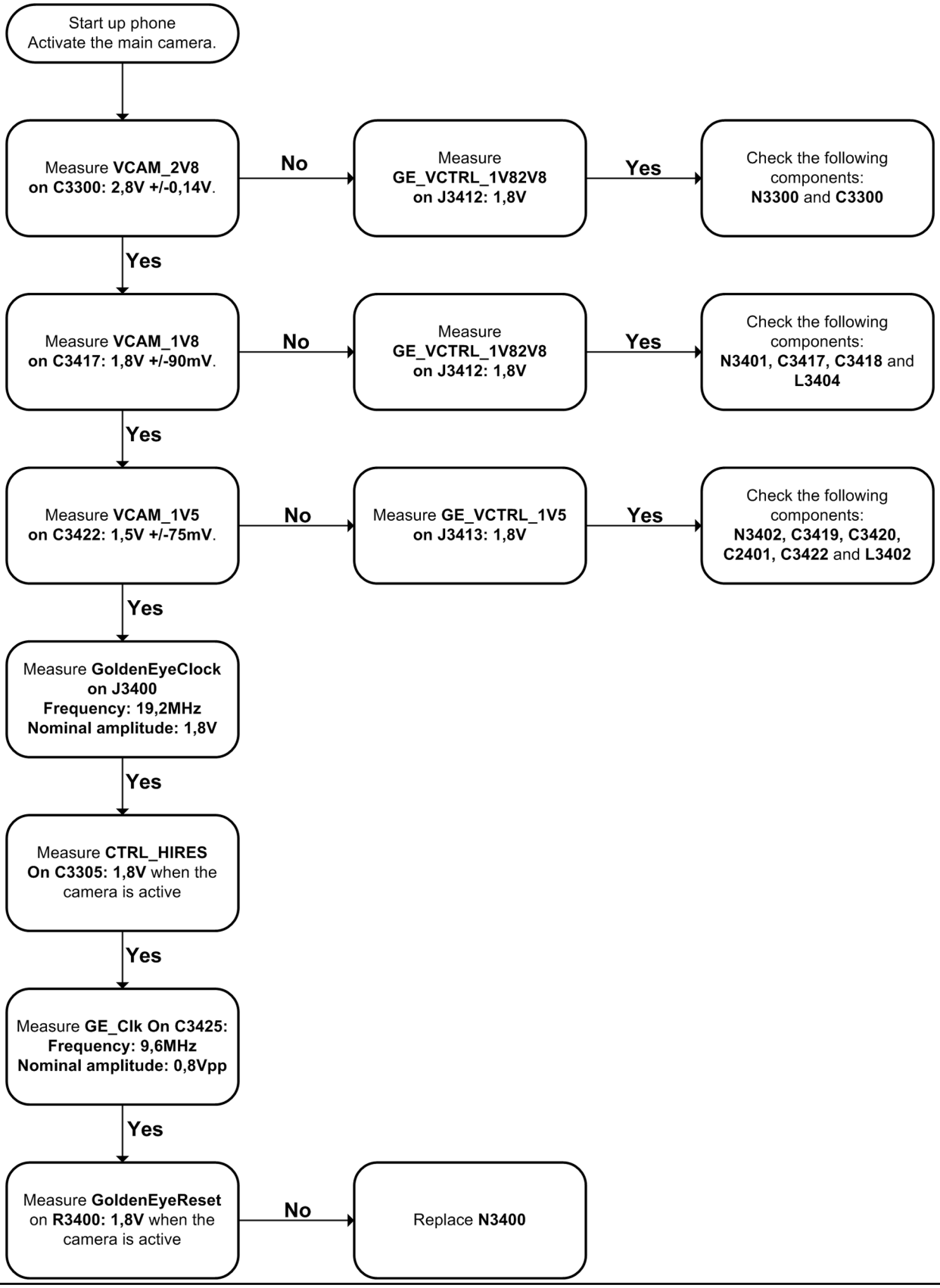
Camera and HWA hardware troubleshooting

Troubleshooting flow



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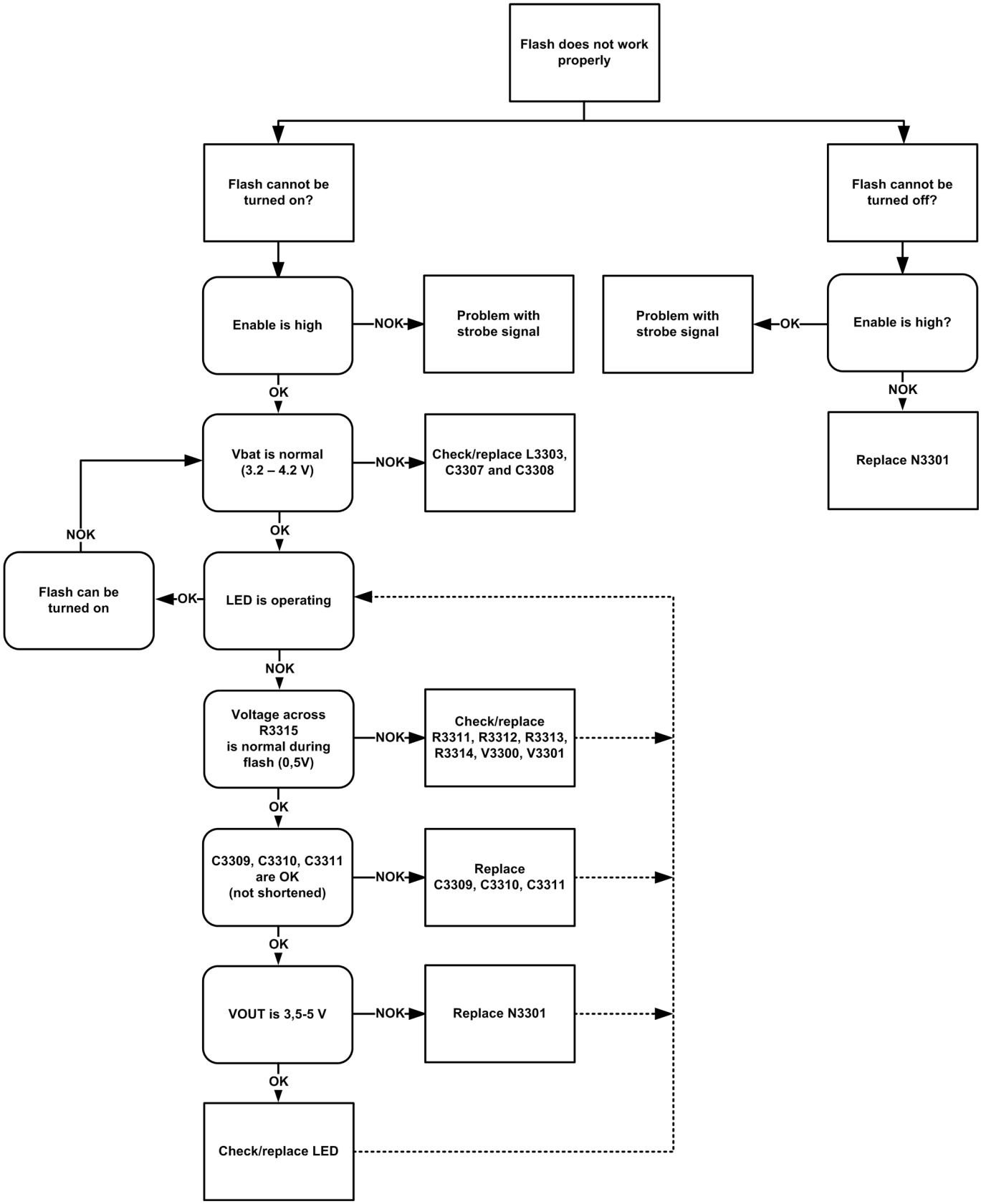
LED camera flash troubleshooting

Troubleshooting flow



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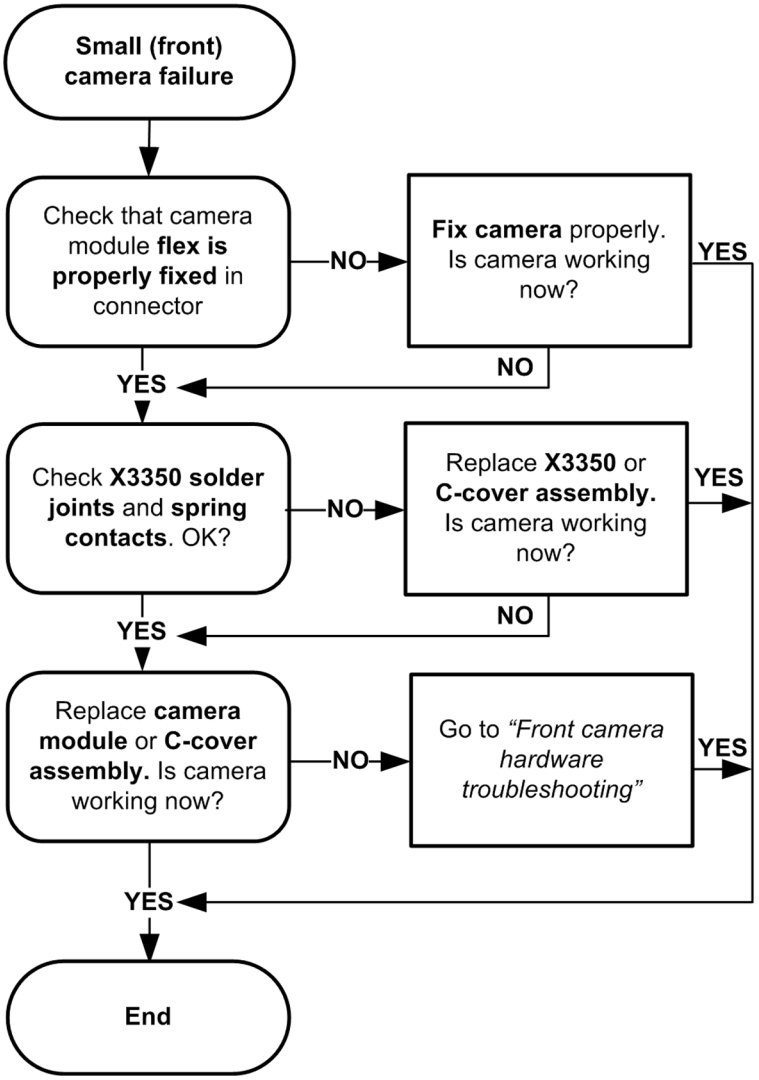
Small (front) camera troubleshooting

Small (front) camera troubleshooting

Troubleshooting flow

***Note**: the phone must be in a video call for the front camera to be active. The front camera image is the small one in the upper right corner*

***Note:** Always use the "troubled" phone when evaluating a picture in a video call. Do not evaluate the picture on the receiving phone*



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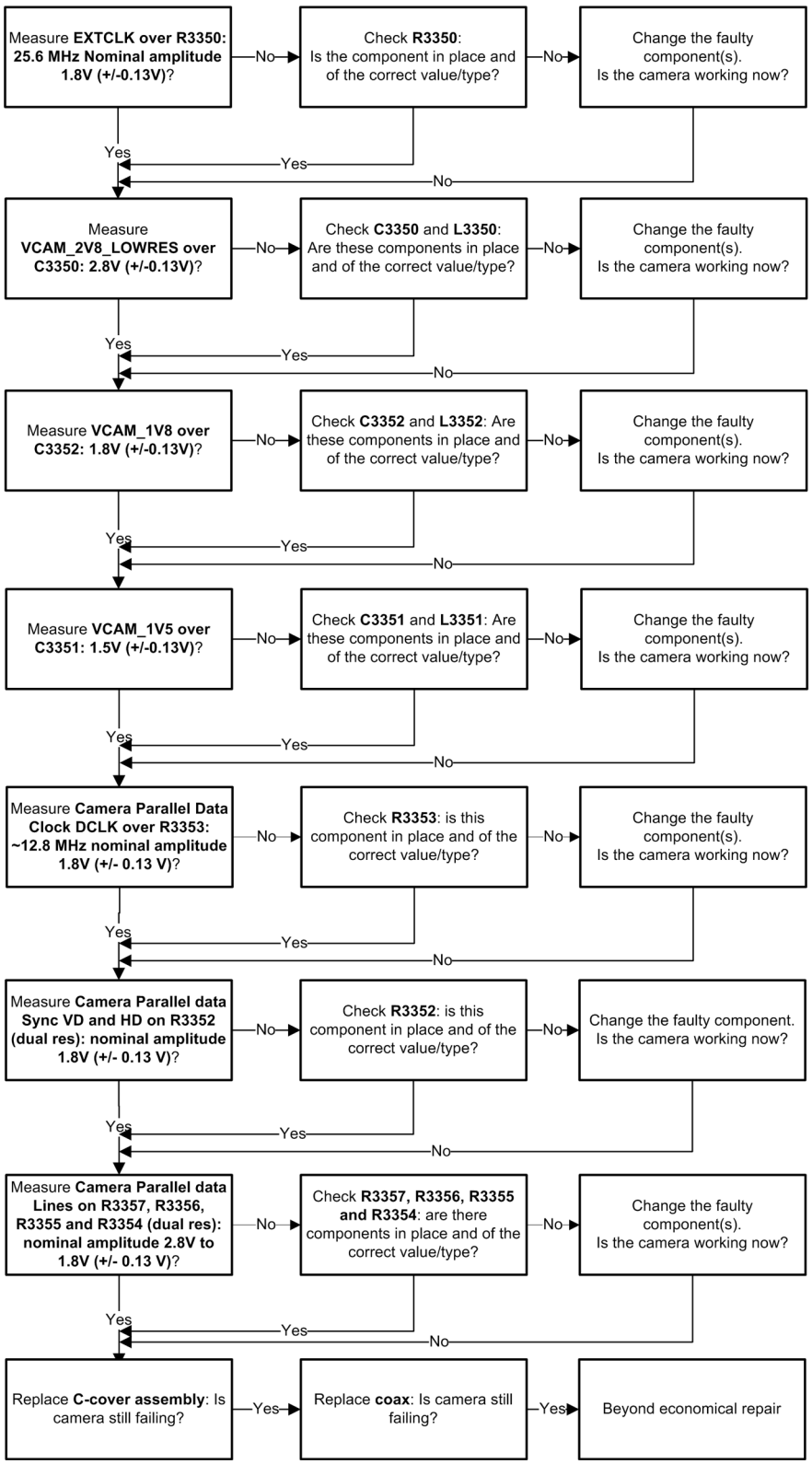
Small (front) camera hardware troubleshooting

Troubleshooting flow

Note: *the phone must be in a video call for the small (front) camera to be active with signals and voltages present*

Note: *Always use the "troubled" phone when evaluating a picture in a video call. Do not evaluate the picture on the receiving phone*



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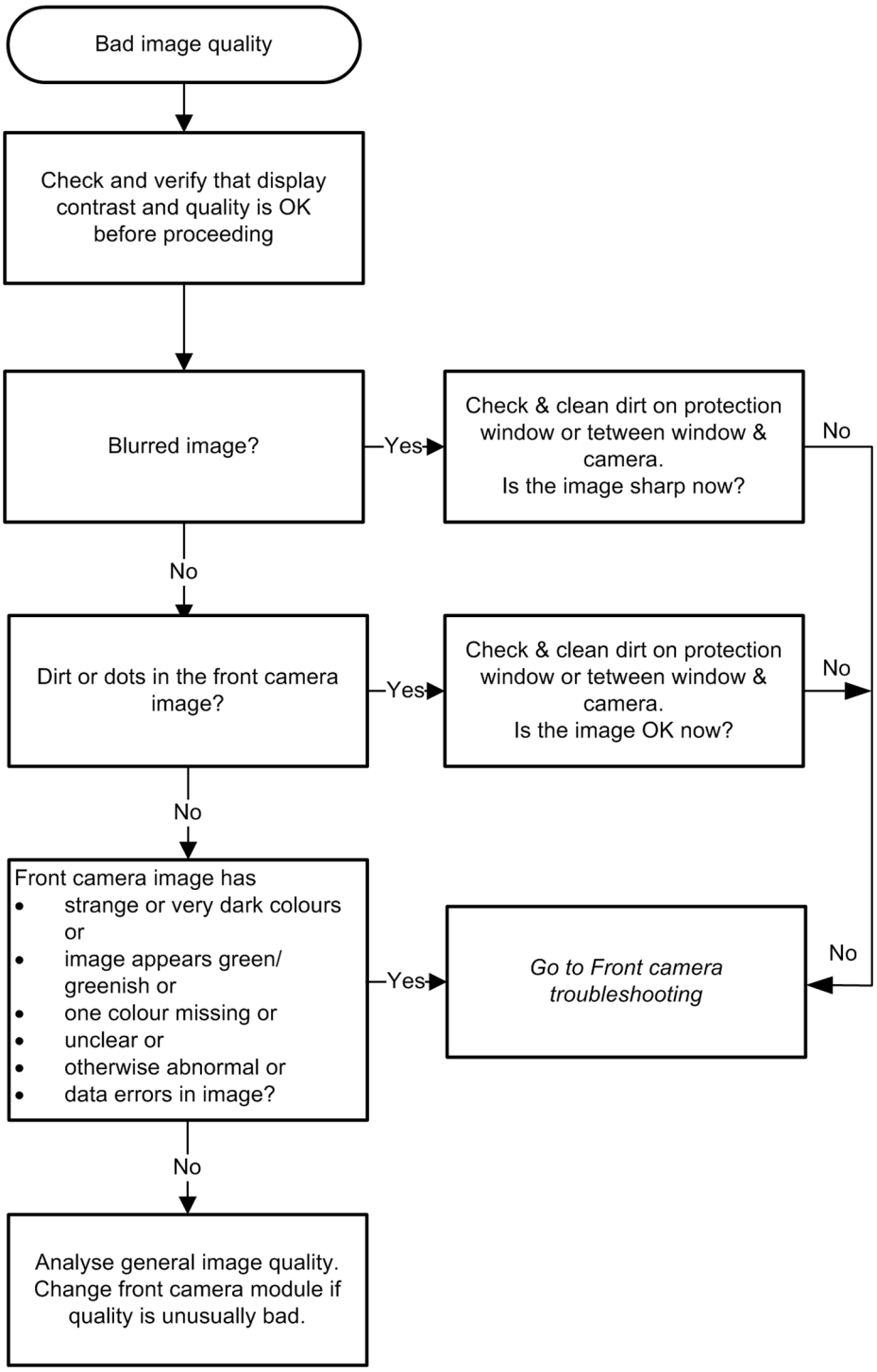
Small (front) camera bad image quality troubleshooting

Troubleshooting flow

***Note**: Phone must be in a video call for the front camera to be active.*

***Note:** Always use the "troubled" phone when evaluating a picture in a video call. Do not evaluate the picture on the receiving phone*



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Audio troubleshooting

Audio troubleshooting test instructions

Differential external earpiece and internal earpiece outputs can be measured either with a single-ended or a differential probe.

When measuring with a single-ended probe each output is measured against the ground.

Internal handsfree output is measured using a current probe, if a special low-pass filter designed for measuring a digital amplifier is not available. Note also that when using a current probe, the input signal frequency must be set to 2kHz.

The input signal for each loop test can be either single-ended or differential.

Required equipment

The following equipment is needed for the tests:

- Oscilloscope
- Function generator (sine waveform)
- 'Active speaker' or 'speaker and power amplifier'
- Sound level meter
- Current probe (Internal handsfree DPMA output measurement)
- Phoenix service software
- Battery voltage 3.7V

Test procedure

Audio can be tested using the Phoenix audio routings option. Three different audio loop paths can be activated:

- External microphone to Internal earpiece
- External microphone to Internal handsfree speaker
- Internal microphone to External earpiece

Each audio loop sets routing from the specified input to the specified output enabling a quick in-out test. Loop path gains are fixed and they cannot be changed using Phoenix. Correct pins and signals for each test are presented in the following table.

Phoenix audio loop tests and test results

The results presented in the table apply when no accessory is connected and battery voltage is set to 3.7V.

Earpiece, internal microphone and speaker are in place during measurement. Applying a headset accessory during measurement causes a significant drop in measured quantities.

The gain values presented in the table apply for a differential output vs. single-ended/differential input.

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Loop test	Input terminal	Output terminal	Path gain [dB] (fixed)	Input voltage [mVp-p]	Differential output voltage [mVp-p]	Output DC level [V]	Output current [mA]
External Mic to External Earpiece	XMICP and GND	HSEAR R P, HSEAR R N and GND	-2.9	1000	720	1.2	NA
		HSEAR P, HSEAR N and GND					
	XMICN and GND	HSEAR R P, HSEAR R N and GND					
		HSEAR P, HSEAR N and GND					
External Mic to Internal Earpiece	XMICP and GND	EarP and GND	-4.5	1000	600	1.2	NA
		EarN and GND					
	XMICN and GND	EarP and GND					
		EarN and GND					
External Mic to Internal handsfree	XMICP and GND	B2102 pads	-5	1000	560	0	25mA (calc.)
	XMICN and GND	B2102 pads					
Internal Mic to External Earpiece	B2100 (OUT/GND)	HSEAR R P, HSEAR R N and GND	22.7	100	1360	1.2	NA
		HSEAR P, HSEAR N and GND					
		HSEAR R P, HSEAR R N and GND					
		HSEAR P, HSEAR N and GND					

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Measurement data

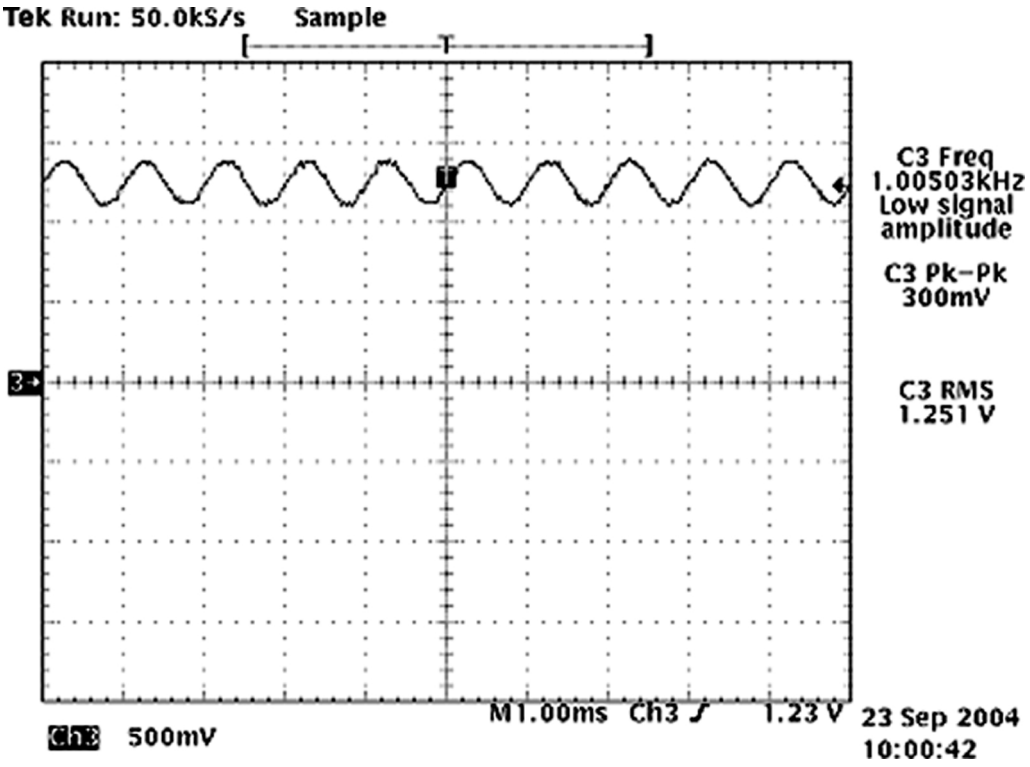
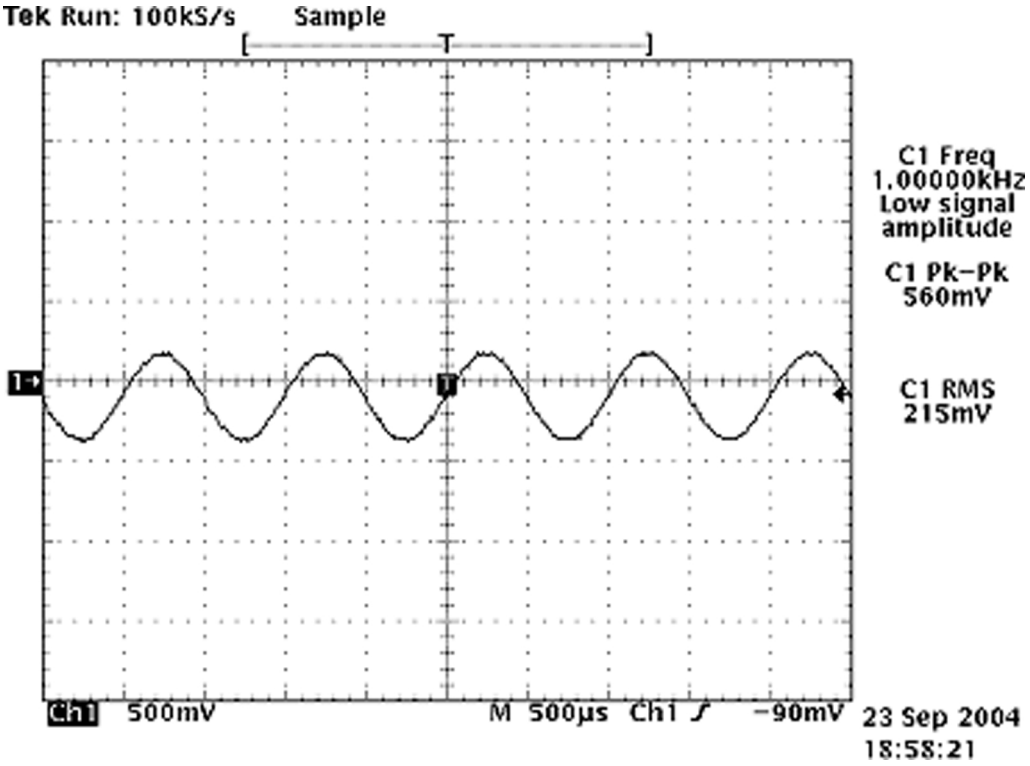


Figure 44 Single-ended output waveform of the Ext_in_HP_out measurement when earpiece is connected.



If a special low-pass filter designed for measuring digital amplifiers is unavailable, the measurement must be performed with a current probe and the input signal frequency must be 2kHz.

Figure 45 Differential output waveform of the Ext_in_IHF_out out loop measurement when speaker is connected.

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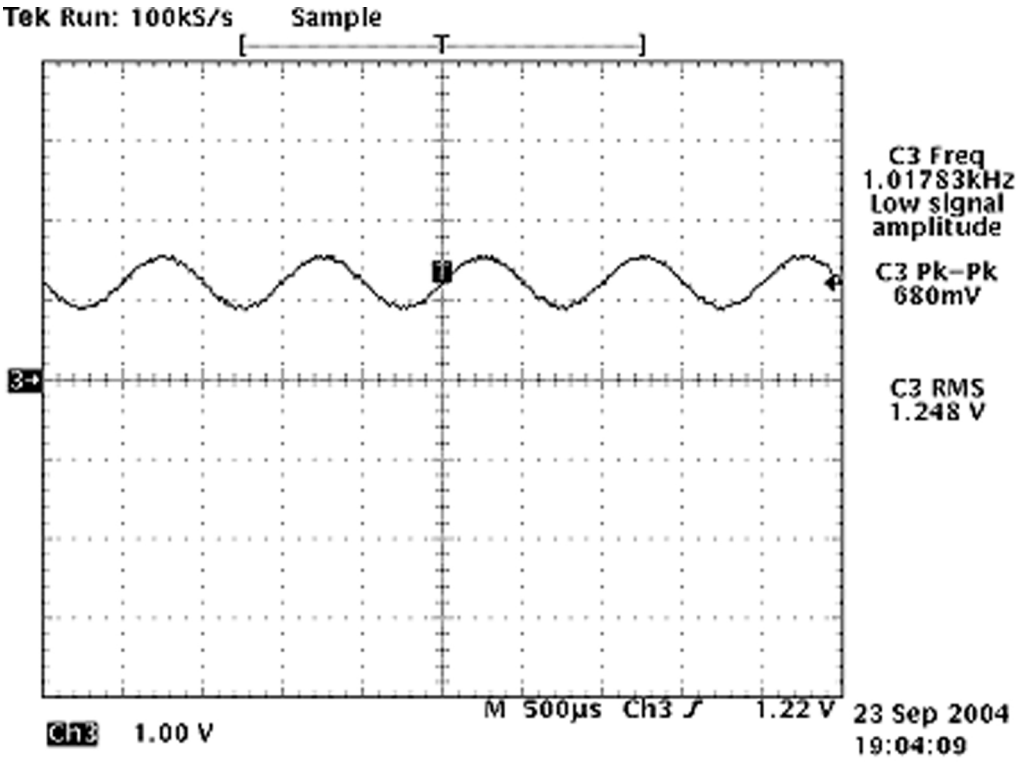

Figure 46 Single-ended output waveform of the HP_in_Ext_out loop when microphone is connected.

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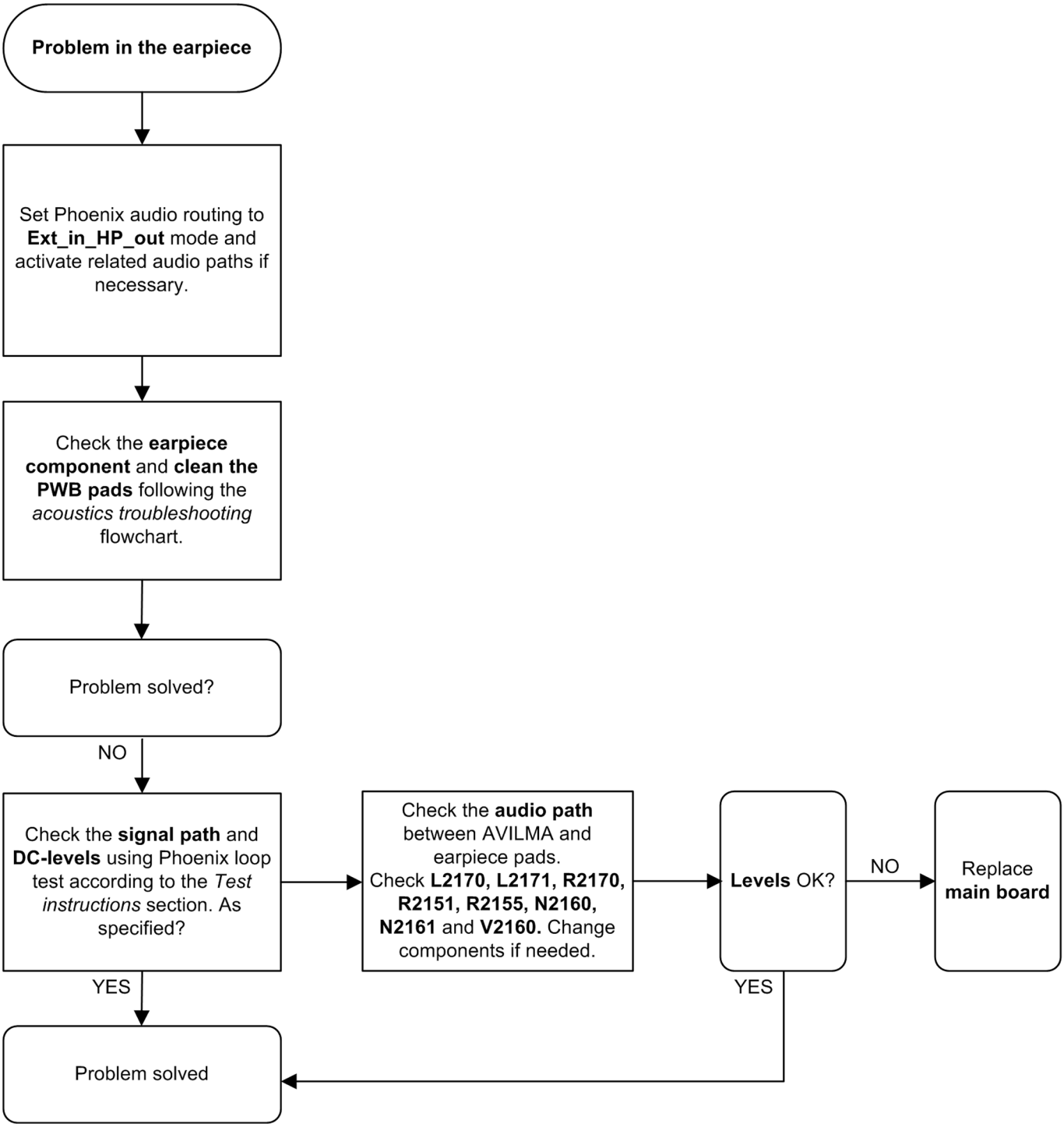
Internal earpiece troubleshooting

Troubleshooting flow



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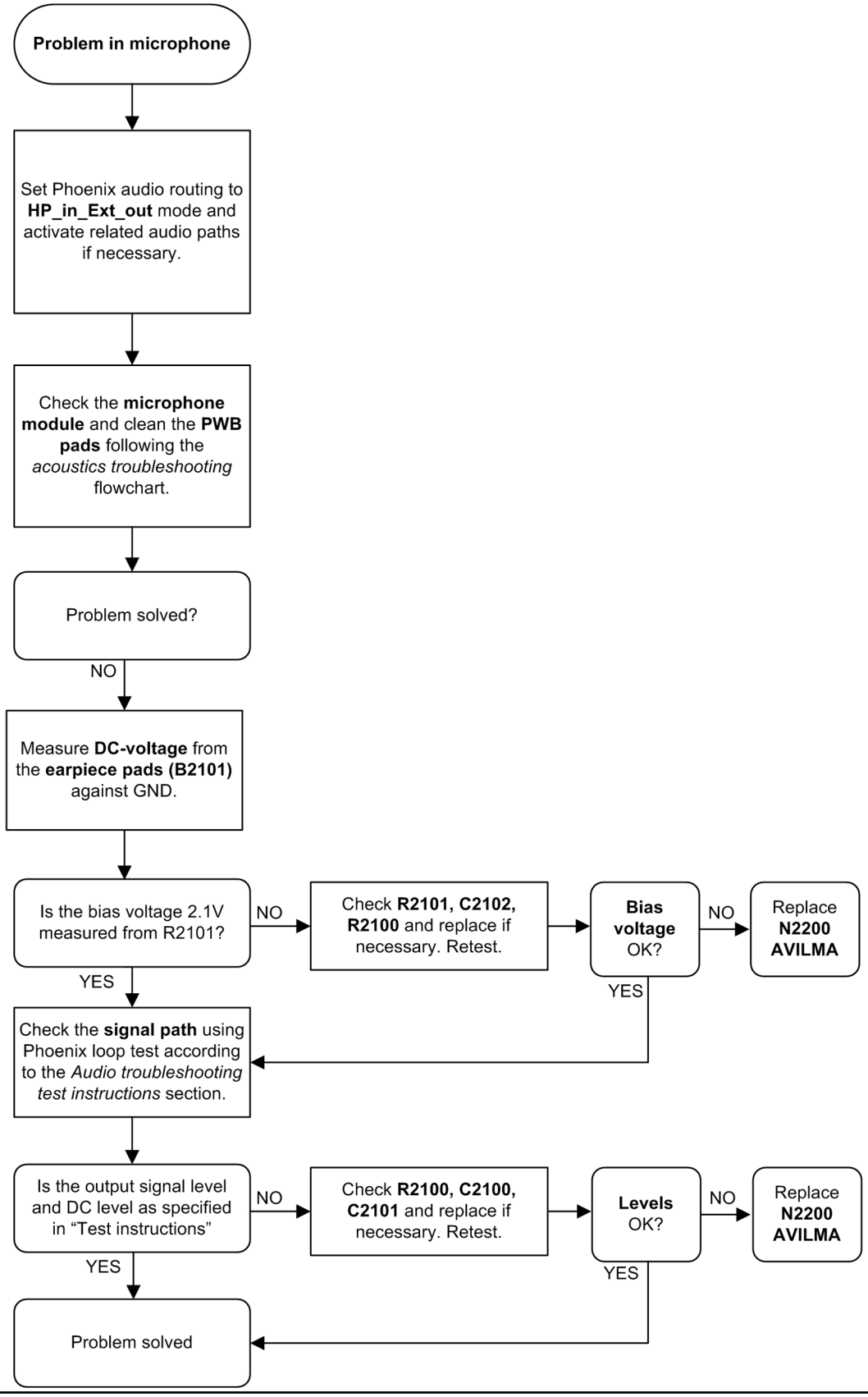
Internal microphone troubleshooting

Troubleshooting flow



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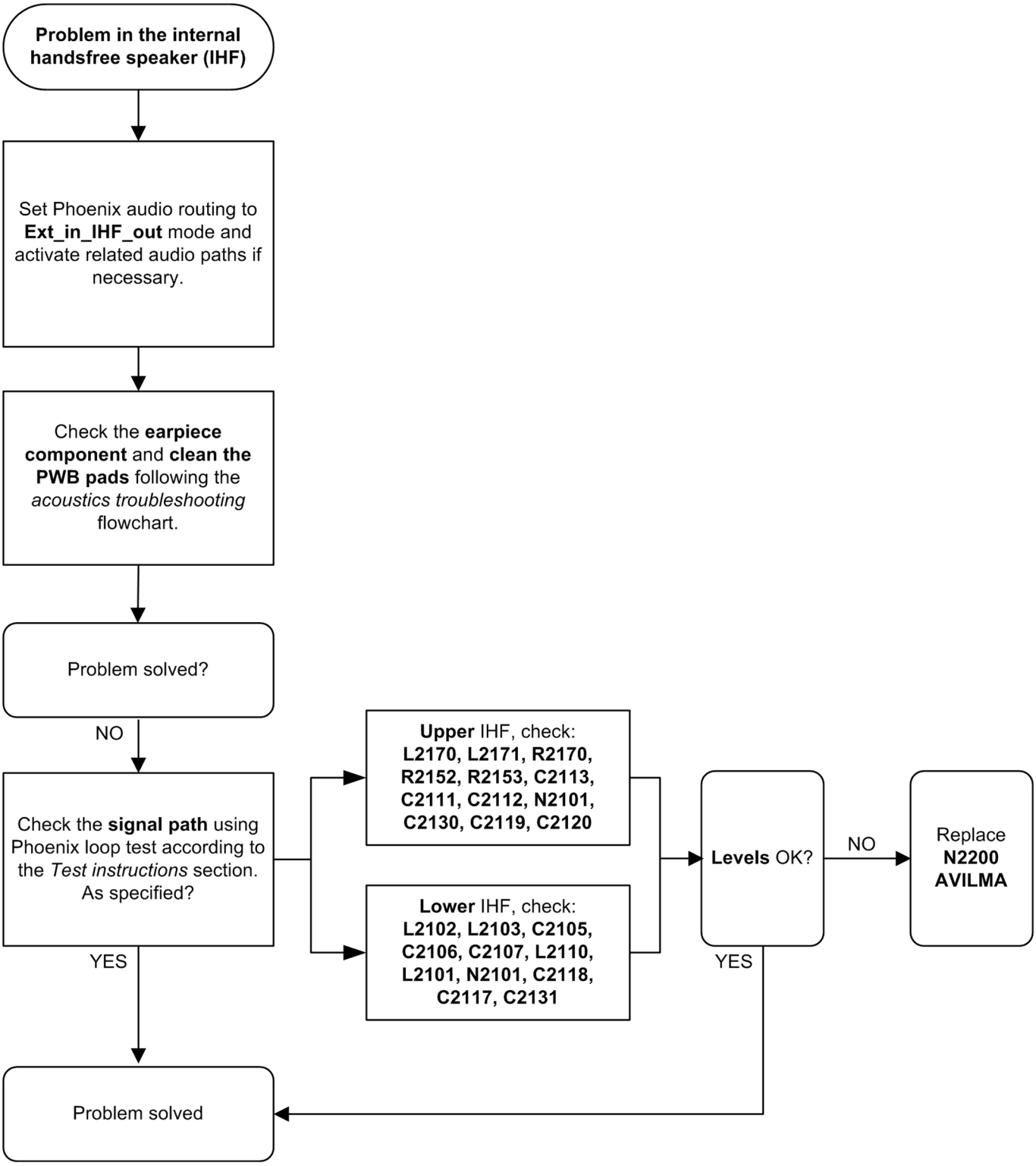
Internal handsfree (IHF) troubleshooting

Troubleshooting flow



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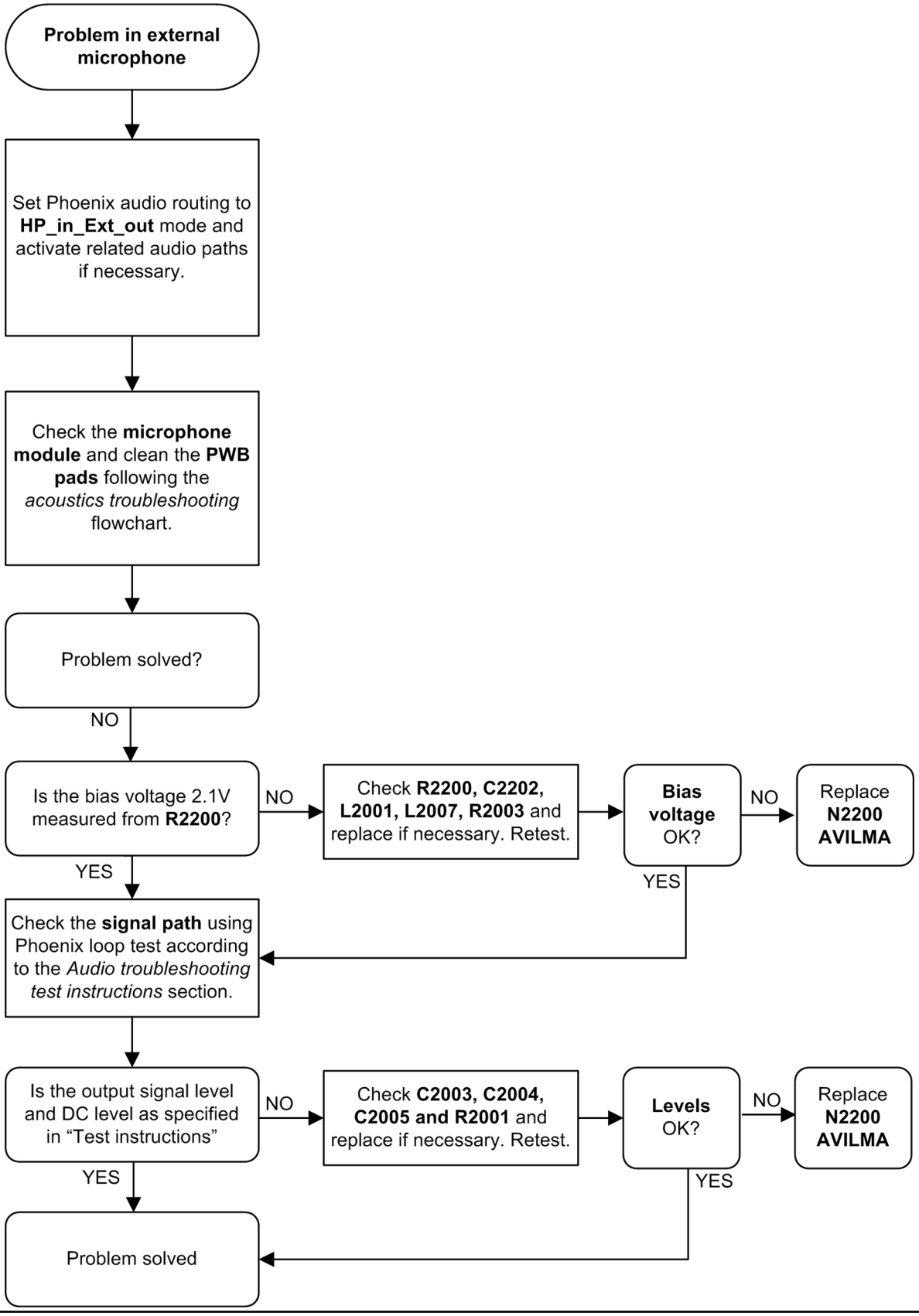
External microphone troubleshooting

Troubleshooting flow



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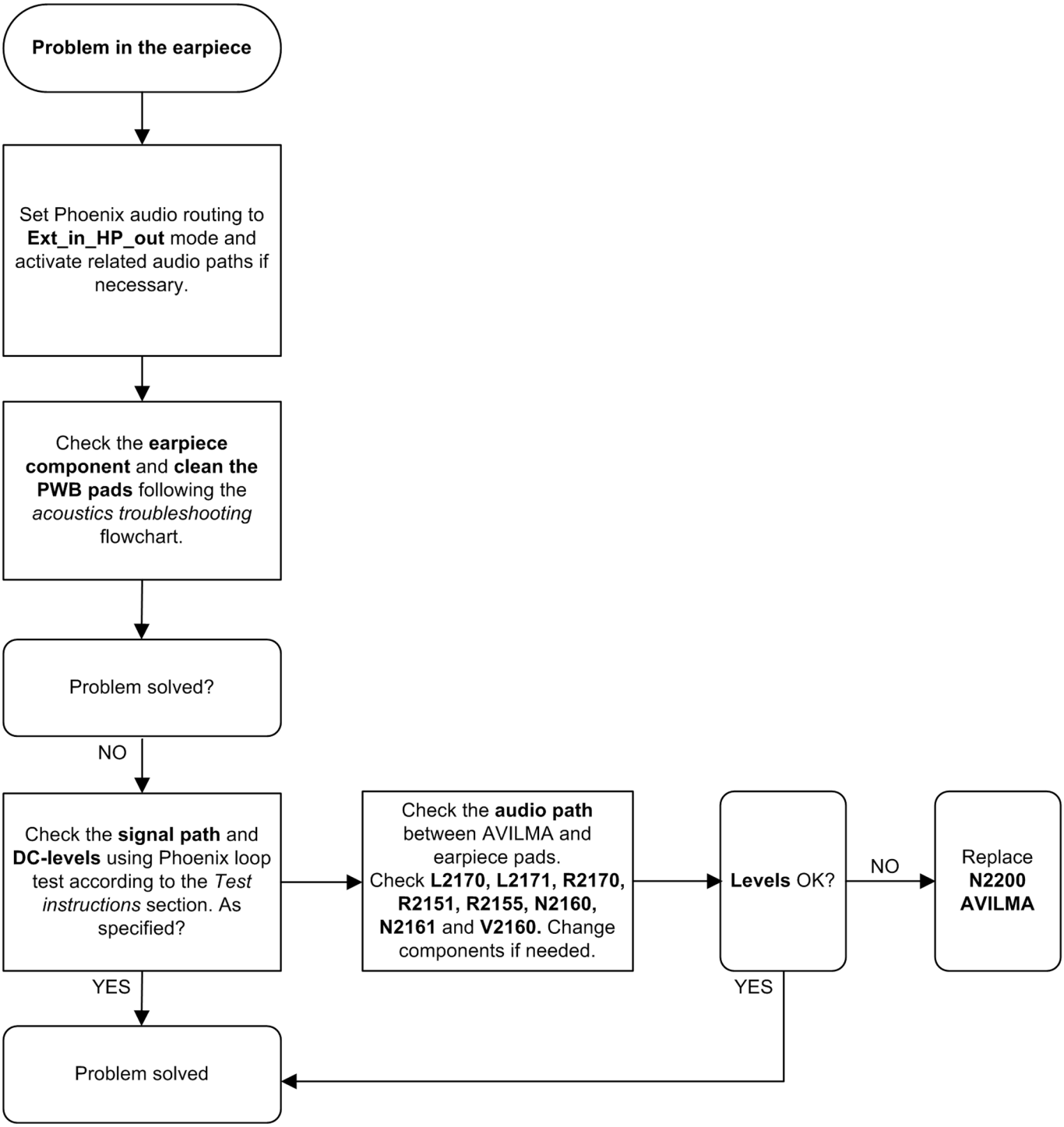
External earpiece troubleshooting

Troubleshooting flow



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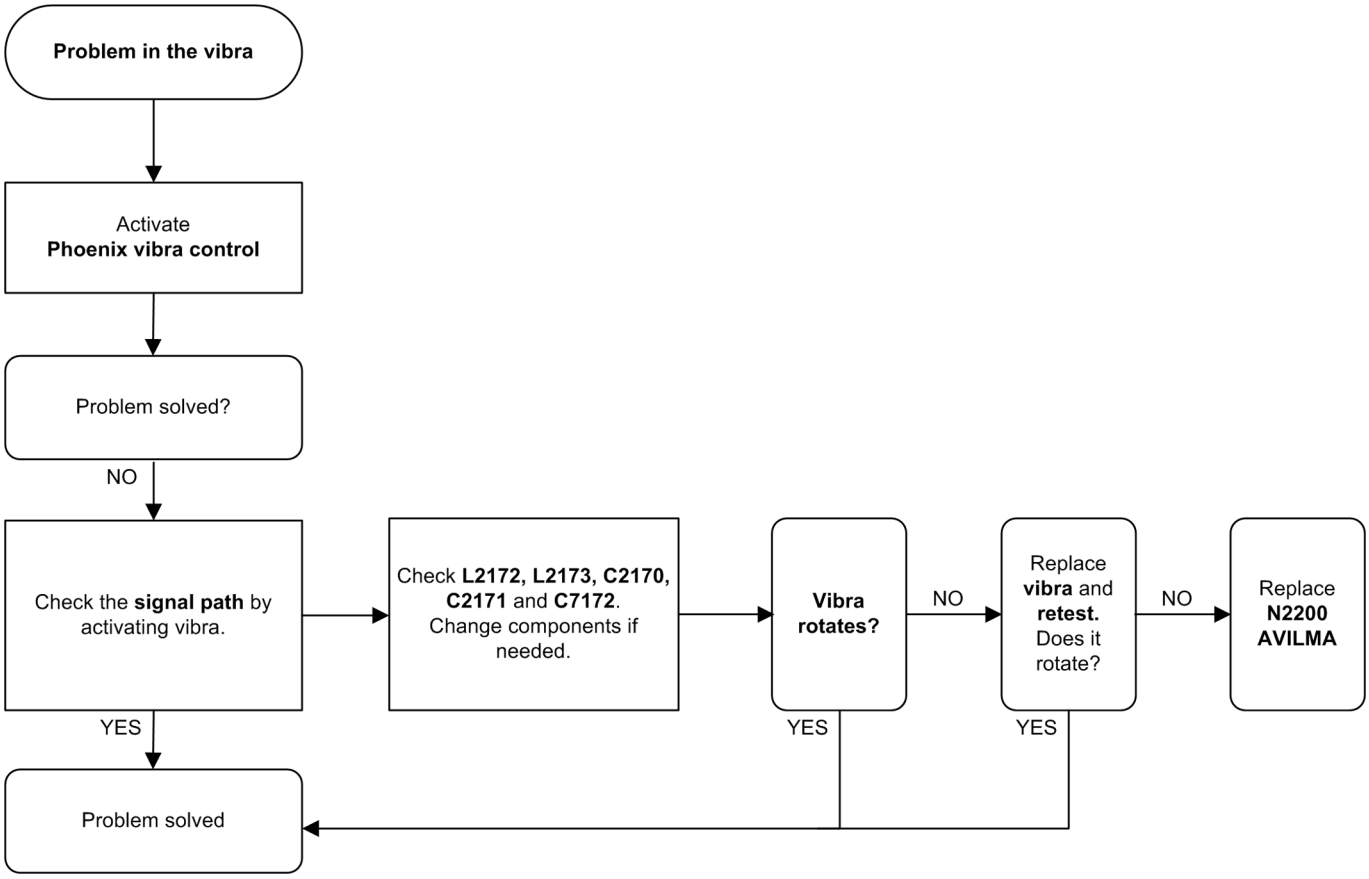
Vibra troubleshooting

Troubleshooting flow



Baseband manual tuning guide

Certificate restoring for BB5 products

Context

This procedure is performed when the device certificate is corrupted for some reason.

All tunings (RF & Baseband, UI) must be done after performing the certificate restoring procedure.

The procedure for certificate restoring is the following:

- Flash the phone with the latest available software using FPS-8 or FPS-10.

  Note: USB flashing does not work for a dead BB5 phone.
- Create a request file.
- Send the file to Nokia by e-mail. Use the following addresses depending on your location:
  - APAC: sydney.service@nokia.com
  - CHINA: repair.ams@nokia.com
  - E&A: salo.repair@nokia.com
  - AMERICAS: fls1.usa@nokia.com
- When you receive a reply from Nokia, carry out certificate restoring.
- Tune the phone completely.

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Note: SX-4 smart card is needed.

- If the phone resets after certificate restoring, reflash the phone again.

Required equipment and setup:

- *Phoenix* service software v 2004.39.7.70 or newer.
- The latest phone model specific *Phoenix* data package.
- PKD-1 dongle
- SX-4 smart card (Enables BB5 testing and tuning features)
- External smart card reader

  Note: The smart card reader is only needed when FPS-8 is used. FPS-10 has an integrated smart card reader.
- Activated FPS-8 flash prommer **OR** FPS-10 flash prommer
- Flash update package 03.18.004 or newer for FPS-8 or FPS-10 flash prommers
- CU-4 control unit
- USB cable from PC USB Port to CU-4 control unit
- Phone model specific adapter for CU-4 control unit
- PCS-1 cable to power CU-4 from external power supply
- XCS-4 modular cable between flash prommer and CU-4

  Note: CU-4 must be supplied with +12 V from an external power supply in all steps of certificate restoring.

Steps

1. Program the phone software.
   i Start *Phoenix* and login. Make sure the connection has been managed correctly for FPS-8 or FPS-10.
   ii Update the phone MCU software to the latest available version.
   If the new flash is empty and the phone cannot communicate with *Phoenix*, reflash the phone.
   iii Choose the product manually from **File→Open Product** , and click **OK**.
   Wait for the phone type designator (e.g. “RM-1”) to be displayed in the status bar.
   iv Go to **Flashing→SW Update** and wait until *Phoenix* reads the product data as shown in the following picture.

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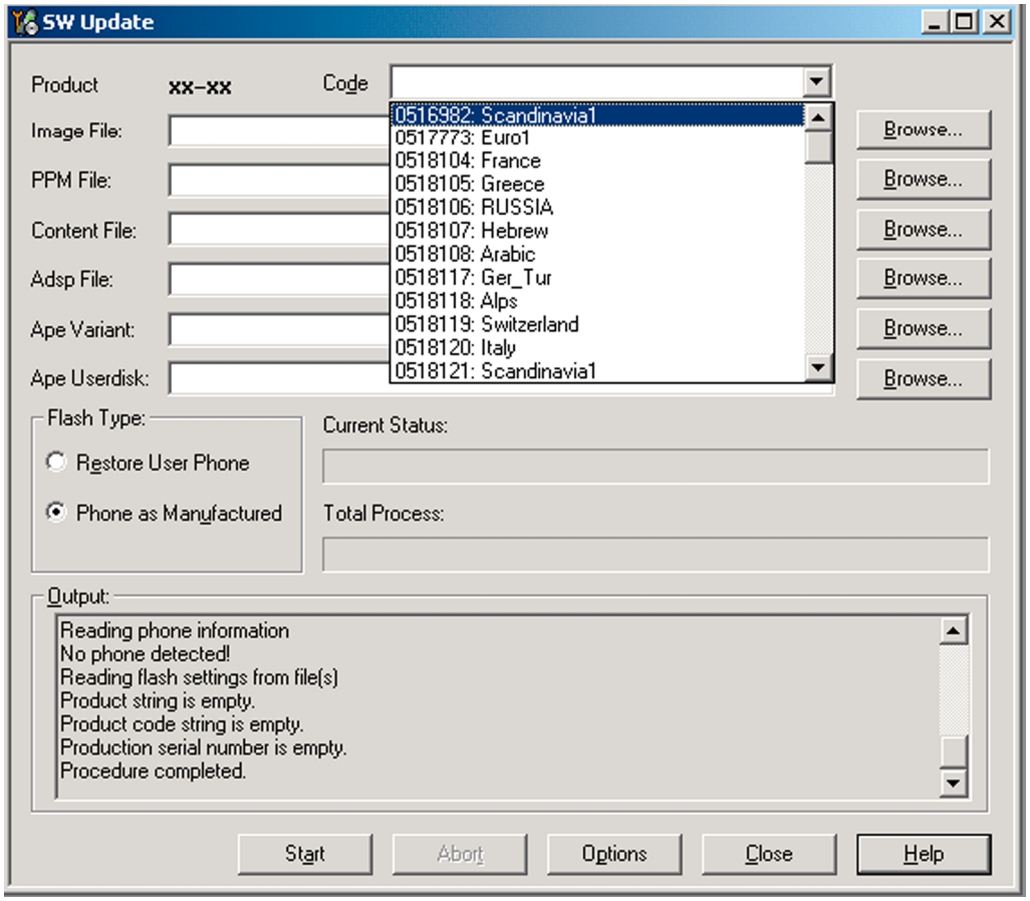

Product	is automatically set according to the phone support module which was opened manually, but the flash files cannot be found because the correct data cannot be read from the phone automatically.
Code	must be chosen manually, it determines the correct flash files to be used. Please choose the correct product code (can be seen in the phone type label) from the dropdown list.
Flash Type	must be set to **Phone as Manufactured**.

v To continue, click **Start**.

Progress bars and messages on the screen show actions during phone programming, please wait.

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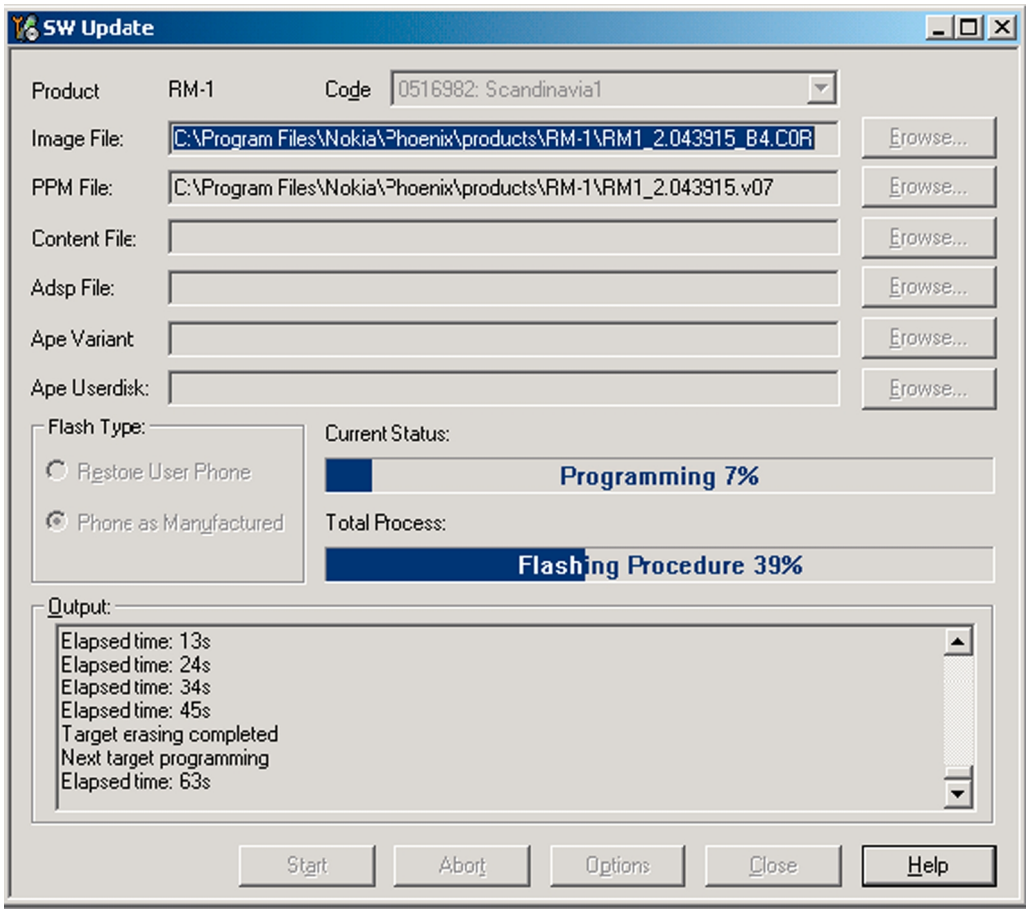


Programming is completed when *Flashing Completed* message is displayed.

The product type designator and MCU SW version are displayed in the status bar.

vi Close the *SW Update* window and then choose **File→Close Product** .

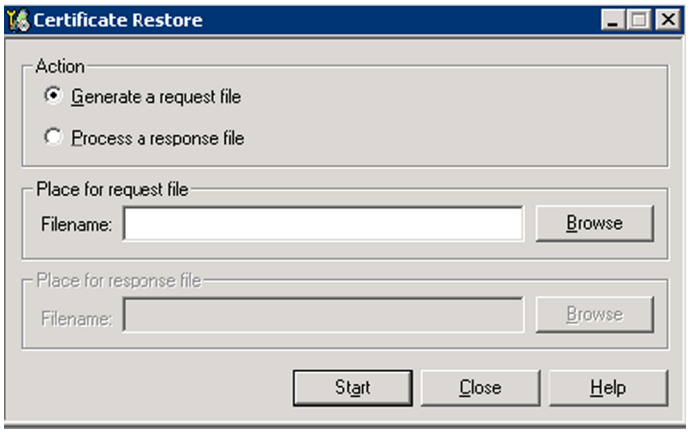
2. Create a *Request* file.

For this procedure, you must supply +12 V to CU-4 from an external power supply.

i To connect the phone with *Phoenix*, choose **File→Scan Product** .

ii Choose **Tools→Certificate Restore** .

iii To choose a location for the request file, click **Browse**.



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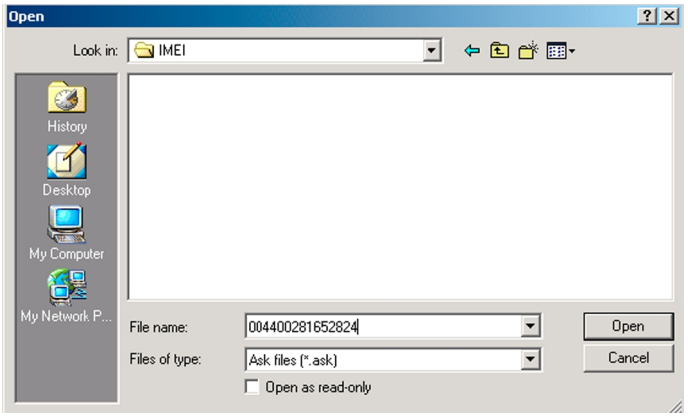
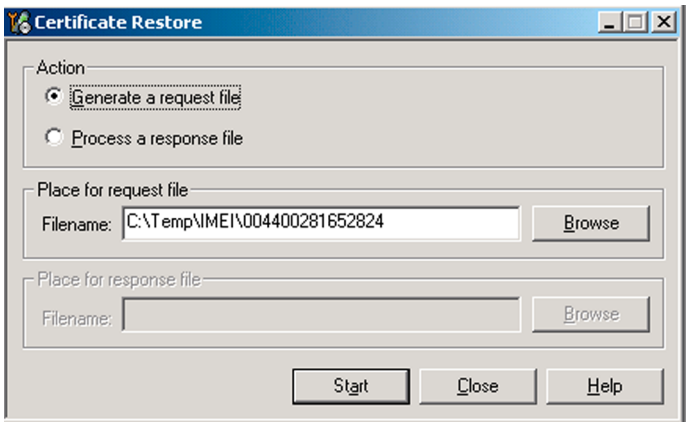
iv Name the file so that you can easily identify it, and click **Open**.



The name of the file and its location are shown.



v To create the *Request* file, click **Start**.

vi When the file for certificate restore has been created, send it to Nokia as an e-mail attachment.

3. Restore certificate.

For this procedure, you must supply +12 V to CU-4 from an external power supply.

i Save the reply file sent by Nokia to your computer.

ii Start *Phoenix* service software.

iii Choose **File→Scan Product** .

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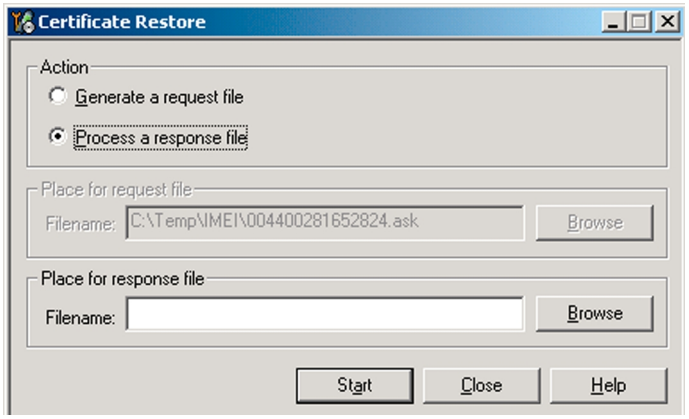
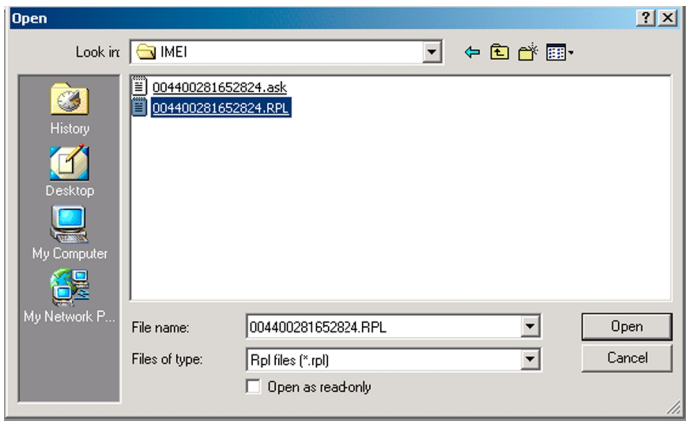
iv From the **Tools** menu, choose **Certificate Restore** and select **Process a response file** in the *Action* pane.



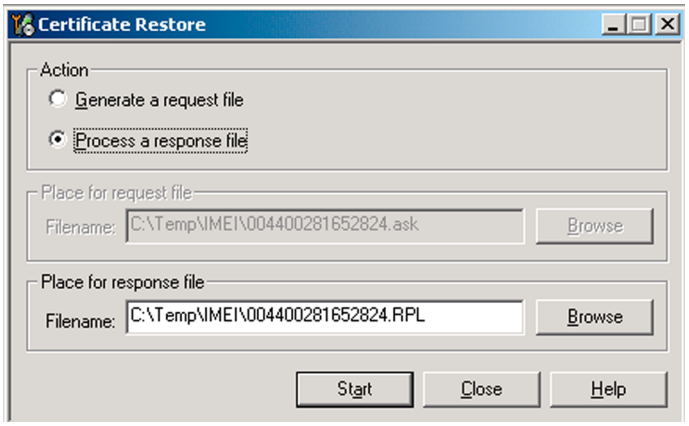
v To choose the location where response file is saved, click **Browse**.

vi Click **Open**.



The name of the file and the path where it is located are shown.

vii To write the file to phone, click **Start**.



Next actions

After a successful rewrite, you must retune the phone completely by using *Phoenix* tuning functions.

Important: Perform all tunings: RF, BB, and UI.

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Energy management calibration

Prerequisites

Energy Management (EM) calibration is performed to calibrate the setting (gain and offset) of AD converters in several channels (that is, **battery voltage**, **BSI**, **battery current**) to get an accurate AD conversion result.

Hardware setup:

- An external power supply is needed.
- Supply 12V DC from an external power supply to CU-4 to power up the phone.
- The phone must be connected to a CU-4 control unit with a product-specific flash adapter.

Steps

1. Place the phone to the docking station adapter (CU-4 is connected to the adapter).
2. Start *Phoenix* service software.
3. Choose **File→ Scan Product.**
4. Choose **Tuning→Energy Management Calibration.**
5. To show the current values in the phone memory, click **Read**, and check that communication between the phone and CU-4 works.
6. Check that the **CU-4 used** check box is checked.
7. Select the item(s) to be calibrated.

   Note: ADC calibration has to be performed before other item(s). However, if all calibrations are selected at the same time, there is no need to perform the ADC calibration first.
8. Click **Calibrate**.

   The calibration of the selected item(s) is carried out automatically.

   The candidates for the new calibration values are shown in the *Calculated values* column. If the new calibration values seem to be acceptable (please refer to the following "Calibration value limits" table), click **Write** to store the new calibration values to the phone permanent memory.

Table 11 Calibration value limits

Parameter	Min.	Max.
ADC Offset	-20	20
ADC Gain	12000	14000
BSI Gain	1100	1300
VBAT Offset	2400	2650
VBAT Gain	19000	23000
VCHAR Gain	N/A	N/A
IBAT (ICal) Gain	7750	12250

9. Click **Read**, and confirm that the new calibration values are stored in the phone memory correctly. If the values are not stored to the phone memory, click **Write** and/or repeat the procedure again.
10. To end the procedure, close the *Energy Management Calibration* window.

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7 — RF troubleshooting

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General RF troubleshooting

Introduction to RF troubleshooting

Most RF semiconductors are static discharge sensitive

ESD protection must be applied during repair (ground straps and ESD soldering irons).

Pre-baking

These parts are moisture sensitive and must be pre-baked prior to soldering:

- RFIC N7506
- Front End Module (FEM) N7520

Discrete components

In addition to the key-components, there are a number of discrete components (resistors, inductors and capacitors) for which troubleshooting is done mainly by *visual inspection*.

Capacitors: check for short circuits.

Resistors: check value with an ohm meter.

Note: In-circuit measurements should be evaluated carefully

Measuring equipment

All measurements should be done using:

- An oscilloscope for low frequency and DC measurements. Recommended probe: 10:1, 10Mohm//8pF.
- A radio communication tester including RF generator and spectrum analyser, for example Rohde & Schwarz CMU200. (Alternatively a spectrum analyser and an RF generator can be used. Some tests in this guide are not possible to perform if this solution is chosen).

  Note: A mobile phone WCDMA transmitter should never be tested with full TX power (only it possible to perform the measurements in a good RF-shielded room). Even low power WCDMA transmitters may disturb nearby WCDMA networks and cause problems to 3G cellular phone communication in a wide area.

  Note: All measurements with an RF coupler should be performed in an RF-shielded environment because nearby base stations can disturb sensitive receiver measurements. If there is no possibility to use RF shielded environment, testing at frequencies of nearby base stations should be avoided.

Level of repair

The scope of this guideline is to enable repairs at key-component level. Some key-components are not accessible, i.e. not replaceable. Please refer to the list of Non replaceable RF components (page 7–6).

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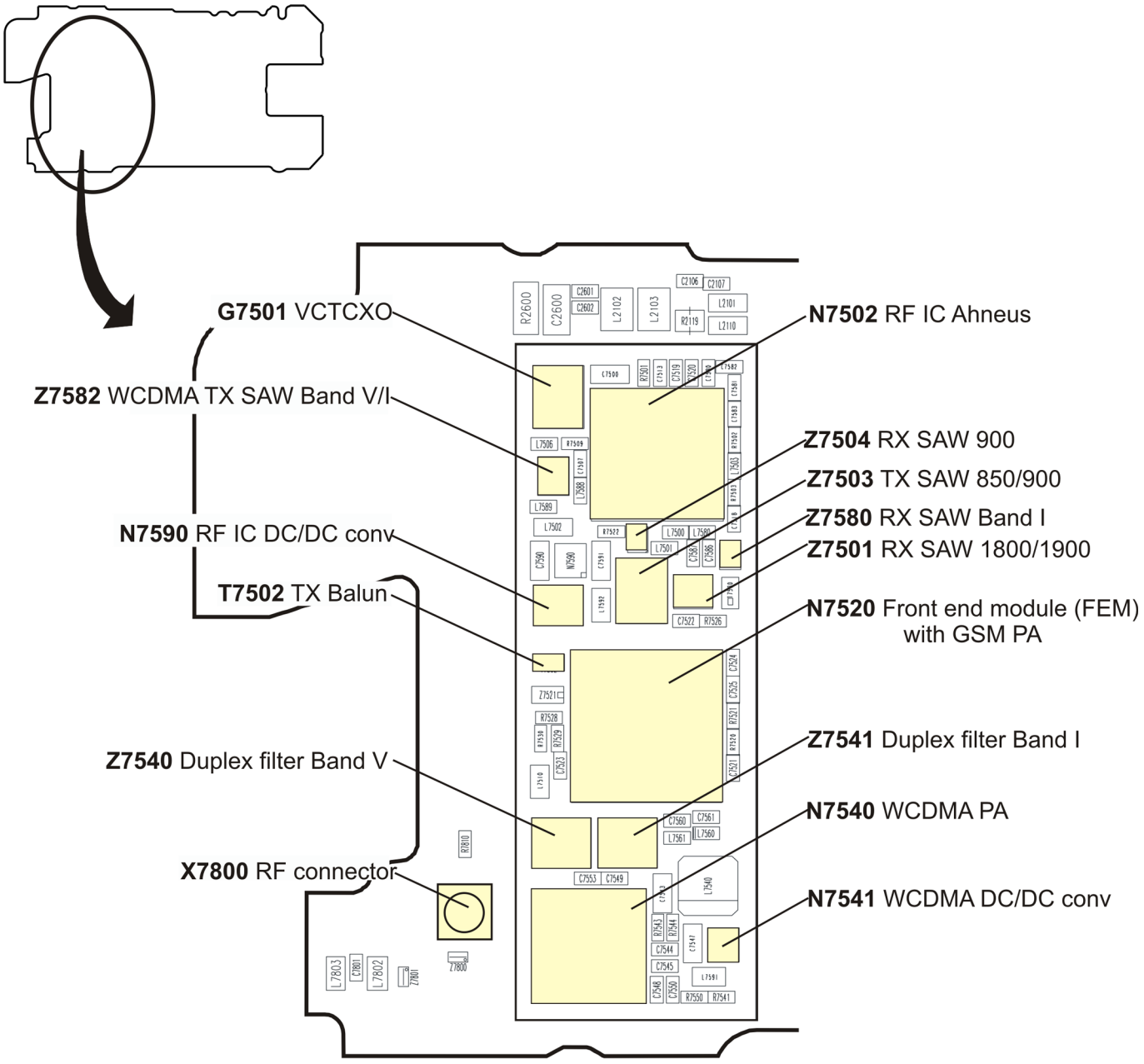
RF key components



Non-replaceable RF components

The following RF components cannot be replaced because of their location on the PWB:

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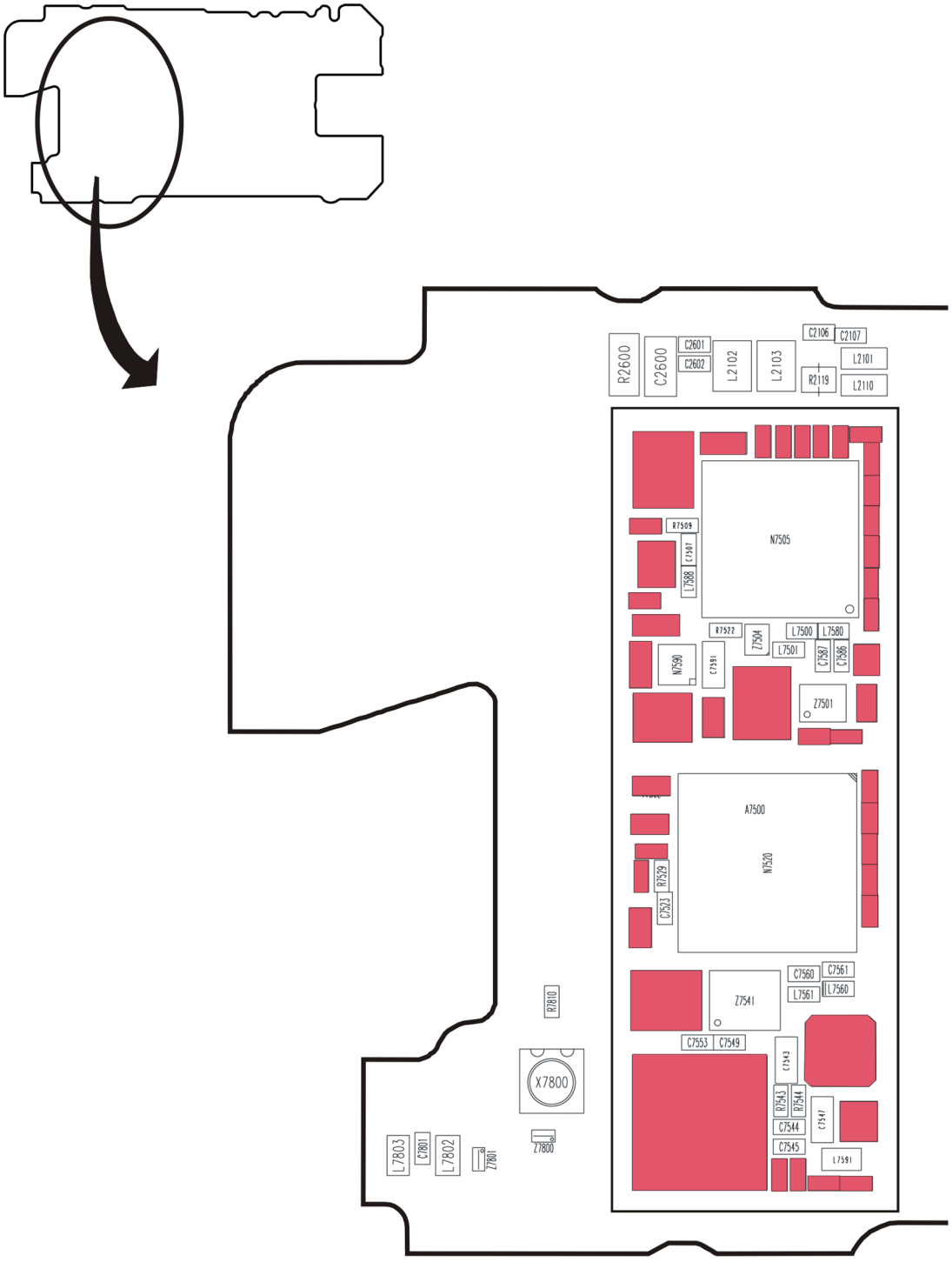

Non-replaceable RF components

C	7500	L	7584
C	7513	L	7589
C	7518	L	7590
C	7519	L	7592
C	7521	N	7540
C	7522	N	7541
C	7524	R	7501
C	7525	R	7503
C	7545	R	7520
C	7548	R	7522
C	7550	R	7526
C	7580	R	7528
C	7581	R	7530
C	7582	R	7541
C	7583	R	7550
C	7590	T	7502
C	7591	T	7580
G	7501	Z	7500
L	7502	Z	7503
L	7503	Z	7521
L	7504	Z	7540
L	7506	Z	7580
L	7510	Z	7582
L	7540	Z	7590

Auto tuning for BB5.0

This phone can be tuned automatically.

Autotune is designed to align the phone's RF part easier and faster. It performs calibrations, tunings and measurements of RX and TX. The results are displayed and logged in a result file, if initiated.

Hardware set up

Hardware requirements for auto tuning:

- PC (Windows 2000/XP) with GPIB card

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- Power supply
- Product specific module jig
- Cables: XRF-1 (RF cable), USB cable, GBIP cable and DAU-9S
- Signal analyser (TX), signal generator (RX) and RF-splitter *or* one device including all.

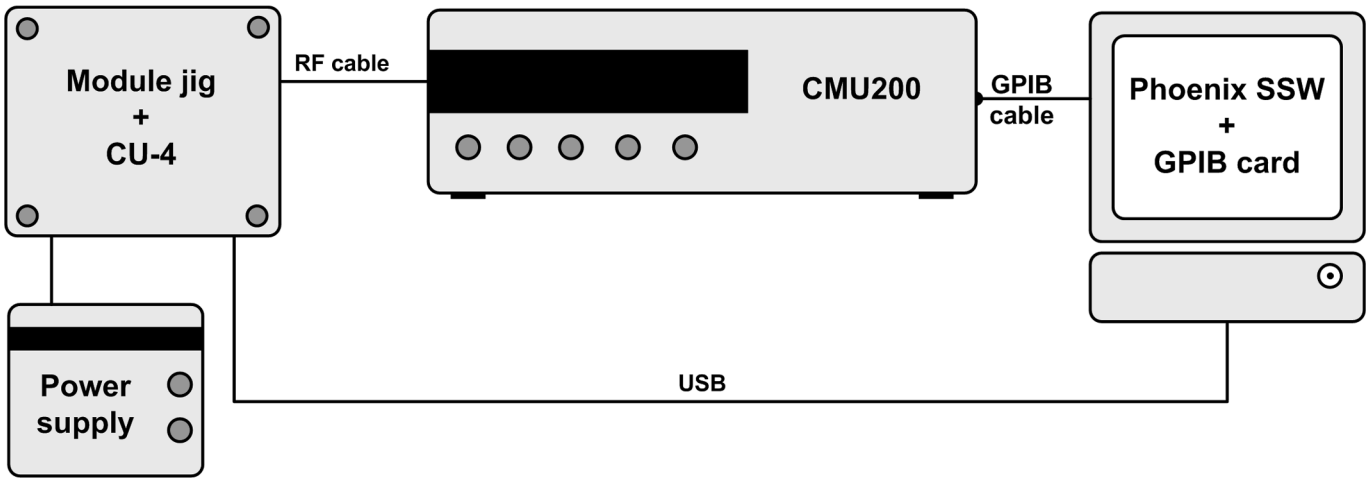

Figure 47 Auto tuning concept with CMU200

Phoenix preparations

Install the phone specific data package, for example *RM-140/220_dp_1.78_sw_sh3.26.exe*. This defines phone specific settings..

Auto tuning procedure

1 Make sure the phone (in the jig) is connected to the equipment. Else, some menus will not be shown in Phoenix.

2 To go to autotune, select *Tuning (Alt-U)* > *Auto-Tune (Alt-A)* from the menu.

3 Start autotuning, clicking the *Tune* button.

General voltage checking

Steps

1. Set up the main board in the module jig. The phone should be in local mode.
2. Check the following:

#	Signal name	Test point	Voltage (all bands)
1	VCTCXO supply	R7501	2.5 V
2	AHNEUS supply from DC/DC conv	C7590	3.1 V
3	FEM supply	C7523	3.9 V
4	WCDMA PA supply from DC/DC conv	C7543	0 V (1.3 V* when transmitting. Settings as in note below)
5	Vbat at WCDMA PA	C7547	3.9 V
6	Supply input to DC/DC conv	L7591	3.9 V

* With these settings, the result should be 1.3 V.

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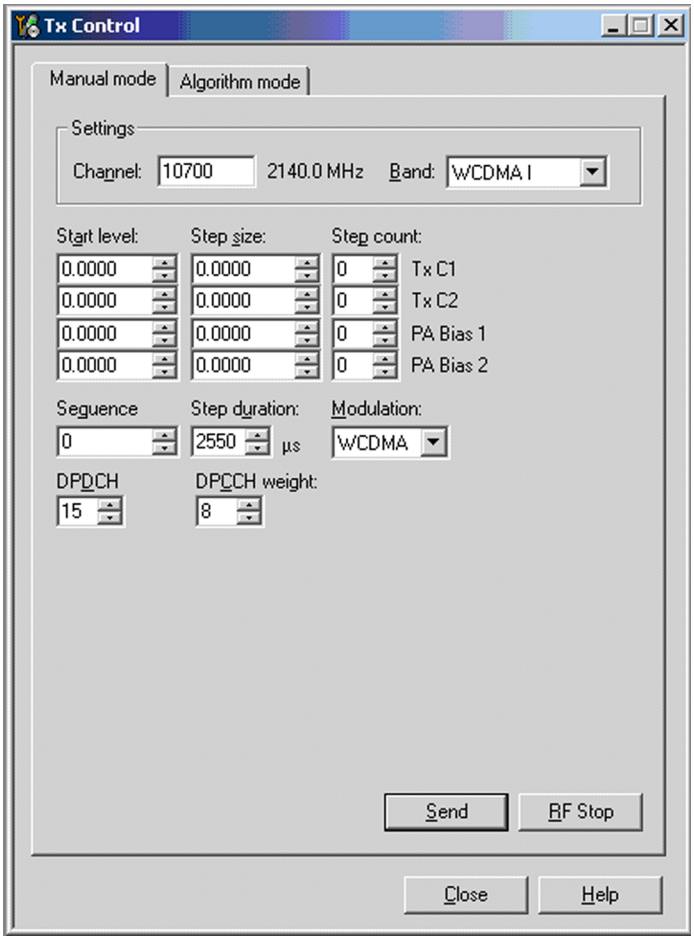

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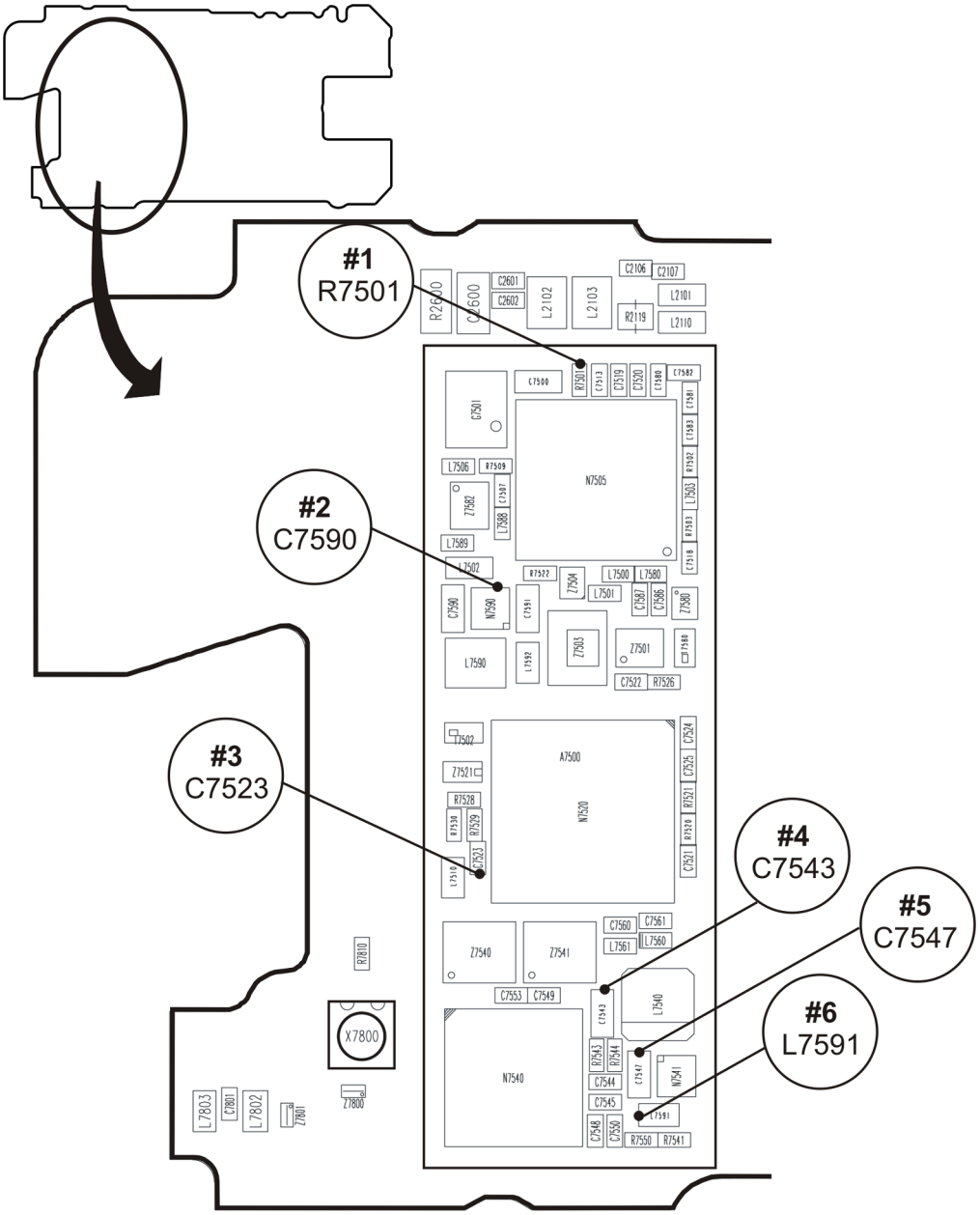

Figure 48 General voltage checking test points (main board, top side)

Receiver troubleshooting

Introduction to receiver (RX) troubleshooting

RX can be tested by making a phone call or in local mode. For the local mode testing, use Phoenix service software.

The main RX troubleshooting measurement is RSSI reading. This test measures the signal strength of the received signal. For GSM RSSI measurements, see GSM RX chain activation for manual measurements / GSM RSSI measurement (page 7–11). For a similar test in WCDMA mode, see WCDMA RSSI measurement (page 7–12).

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GSM RX chain activation for manual measurements/GSM RSSI measurement

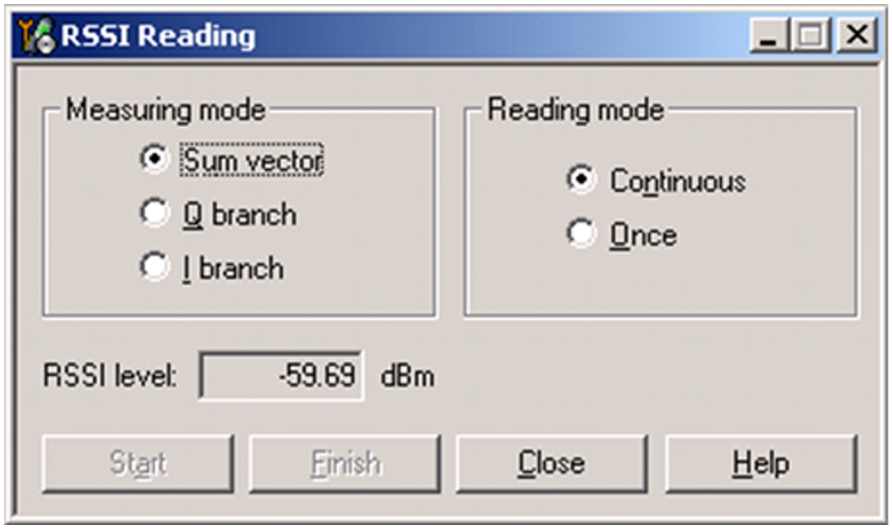
Prerequisites

Make the following settings in Phoenix service software:

Setting	GSM900	GSM1800	GSM1900
Phoenix Channel	37	955	661
Signal generator to antenna connector	942.46771MHz (67.71kHz offset) at -60dBm	1842.846771MHz (67.71kHz offset) at -60dBm	1960.046771MHz (67.71kHz offset) at -60dBm

Steps

1. Set the phone to local mode.
2. Activate RSSI reading in Phoenix (**Testing→GSM→RSSI reading**)



Results

The reading should reflect the level of the signal generator (-losses) +/- 5 dB.

When varying the level in the range -30 to -102 dBm the reading should then follow within +/-5 dB.

WCDMA RX chain activation for manual measurement

Steps

1. Via Phoenix Testing menu, choose **WCDMA/RX Control**.
2. In the RX control window, make the following settings:

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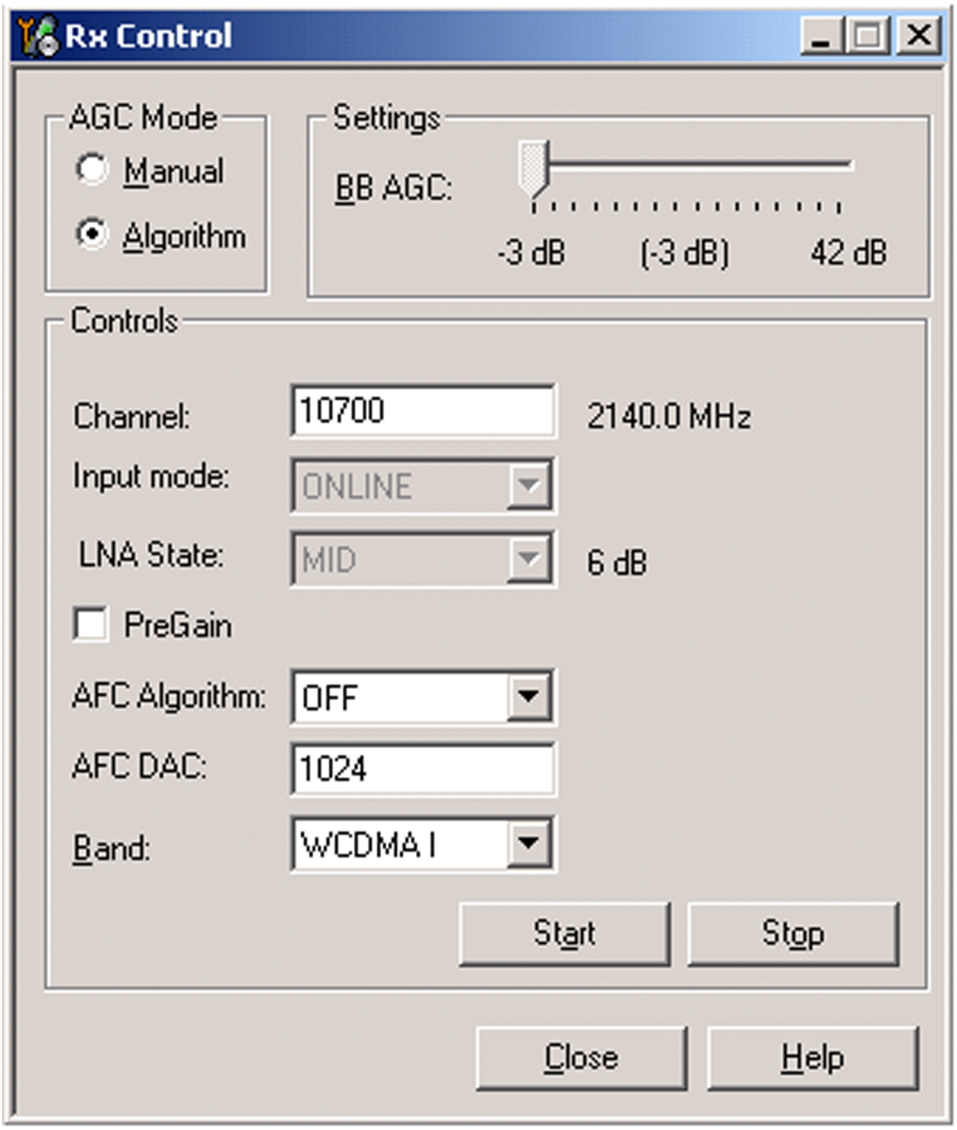

3. Click **Start** to activate the settings.

   If the settings are changed later on (for example, change of channel) you have to click **Stop** and **Start** again.

   Note: Clicking **Stop** also disables TX control if it was active.

WCDMA RSSI measurement

Prerequisites

WCDMA RX must be activated before RSSI can be measured. For instructions, please refer to WCDMA RX chain activation (page 7–11).

Steps

1. From the Phoenix testing menu, select **WCDMA→RX Power measurement**
2. In the RX Power measurement window, select:
   - Mode: RSSI
   - Continuous mode

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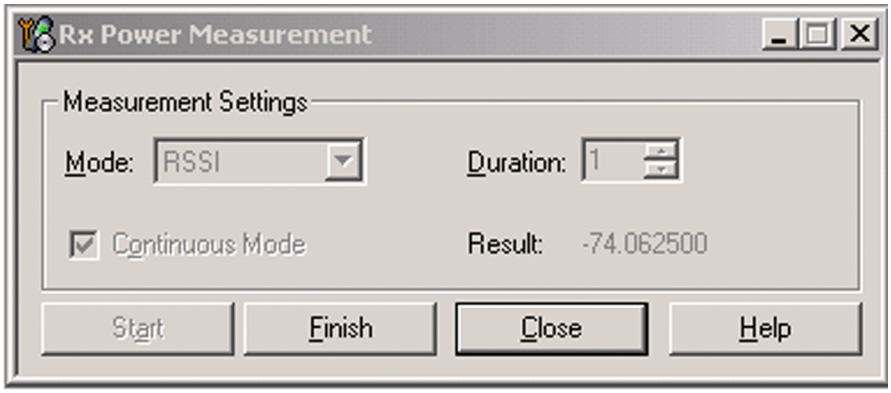

3. Click **Start** to perform the measurement.

Transmitter troubleshooting

General instructions for transmitter (TX) troubleshooting

Please note the following before performing transmitter tests:

- TX troubleshooting requires TX operation.
- Do not transmit on frequencies that are in use!
- The transmitter can be controlled in local mode for diagnostic purposes.
- The most useful Phoenix tool for GSM transmitter testing is “RF Controls”; in WCDMA transmitter testing the best tool is “TX Control”.
- Remember that re-tuning is not a fix! Phones are tuned correctly in production

  Note: Never activate the GSM or WCDMA transmitter without a proper antenna load. Always connect a 50 Ω load to the RF connector (antenna, RF-measurement equipment or at least a 2 W dummy load); otherwise the GSM or WCDMA Power amplifier (PA) may be damaged.

GSM transmitter troubleshooting

Prerequisites

Always start troubleshooting the lowest band, eg. GSM900.

Steps

1. Set the phone to local mode.
2. Activate RF controls in Phoenix (**Testing→GSM→Rf Controls**).

   Make settings like shown in the picture:

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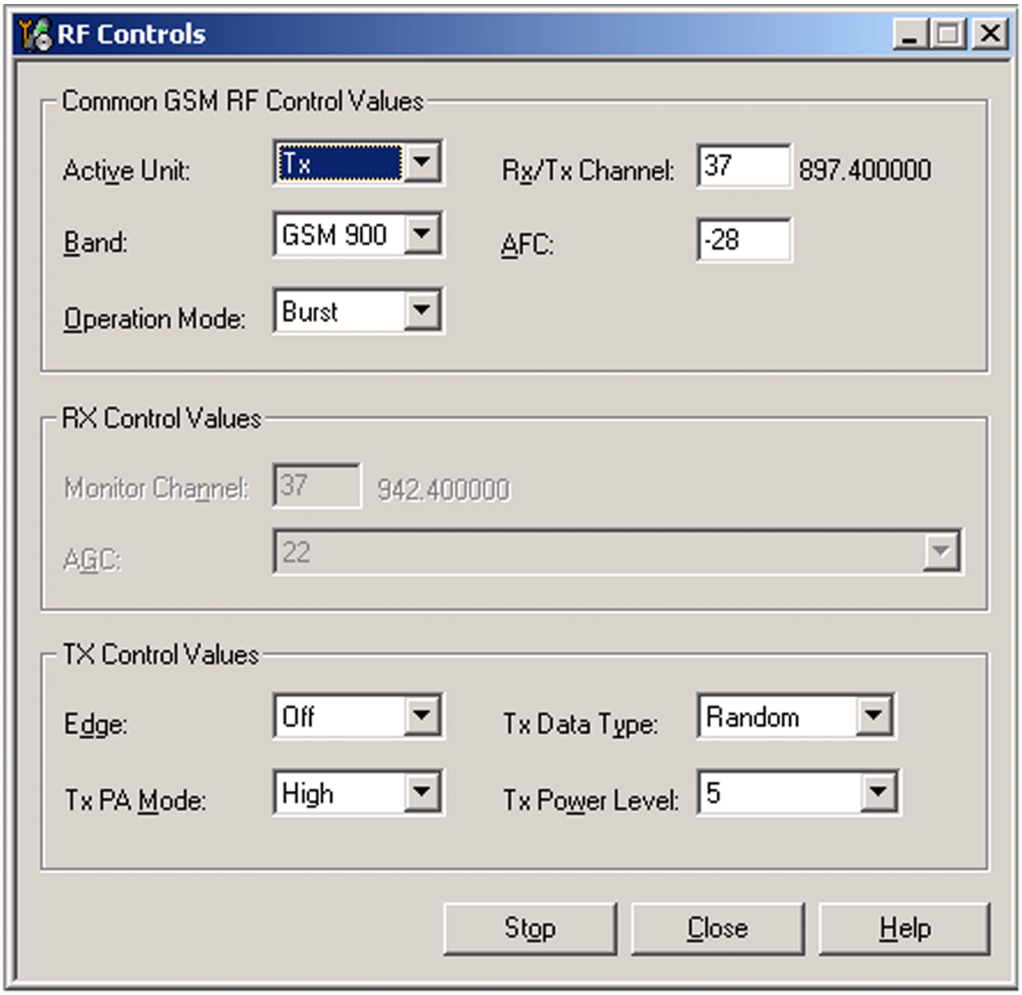

3. Check the basic TX parameters (i.e. power, phase error, modulation and switching spectrum), using a communication amalyser (for example CMU200).

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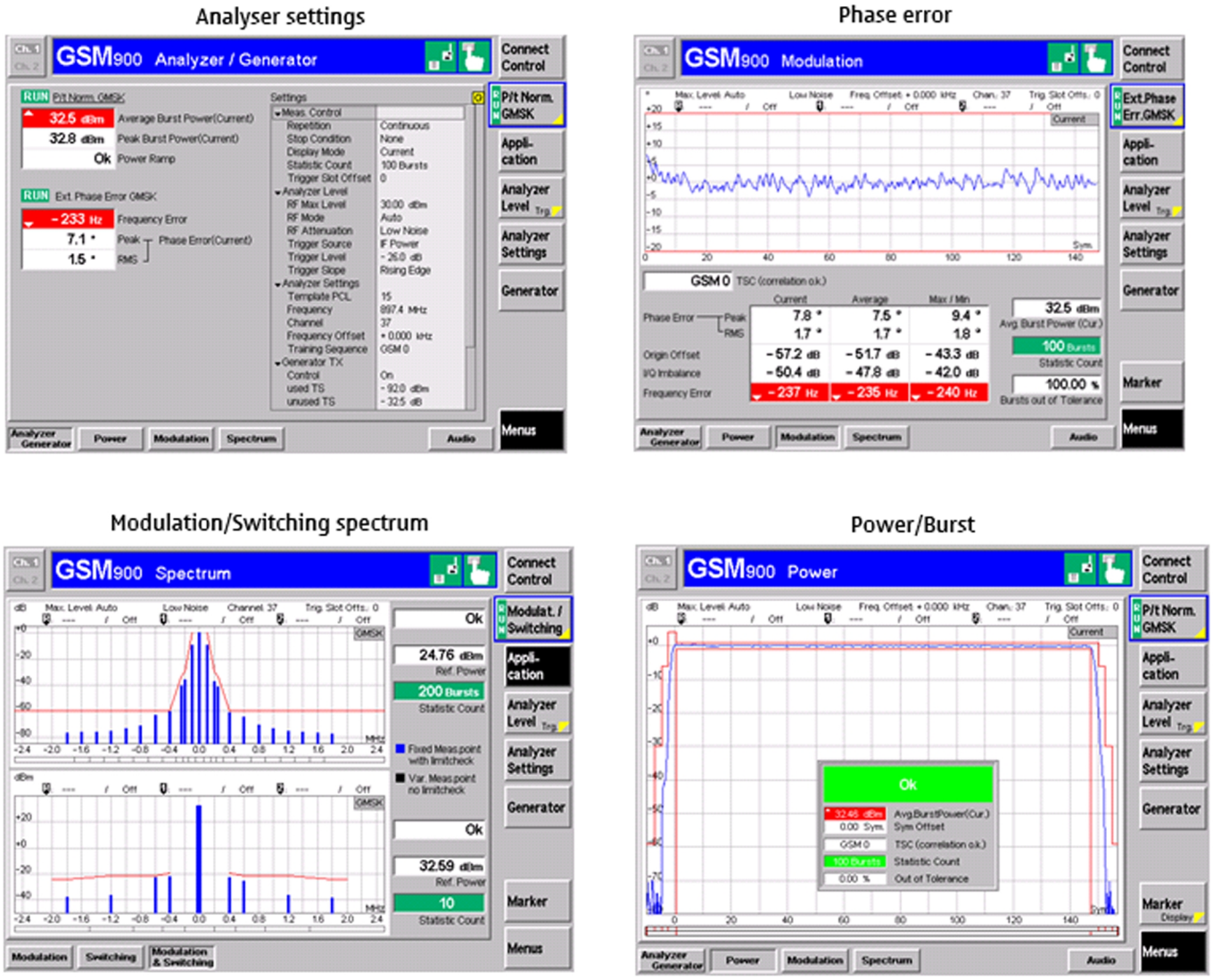

Figure 49 Typical readings

4. Change power level (RF controls) and make sure the power reading follows accordingly.

Next actions

If you want to troubleshoot band GSM1800 or GSM1900, change band with RF controls and set the communication analyser accordingly.

WCDMA transmitter troubleshooting

Steps

1. Set the phone to local mode.
2. In Phoenix, select **Testing→WCDMA→TX control** .
3. In the TX control window, make settings like in the picture:

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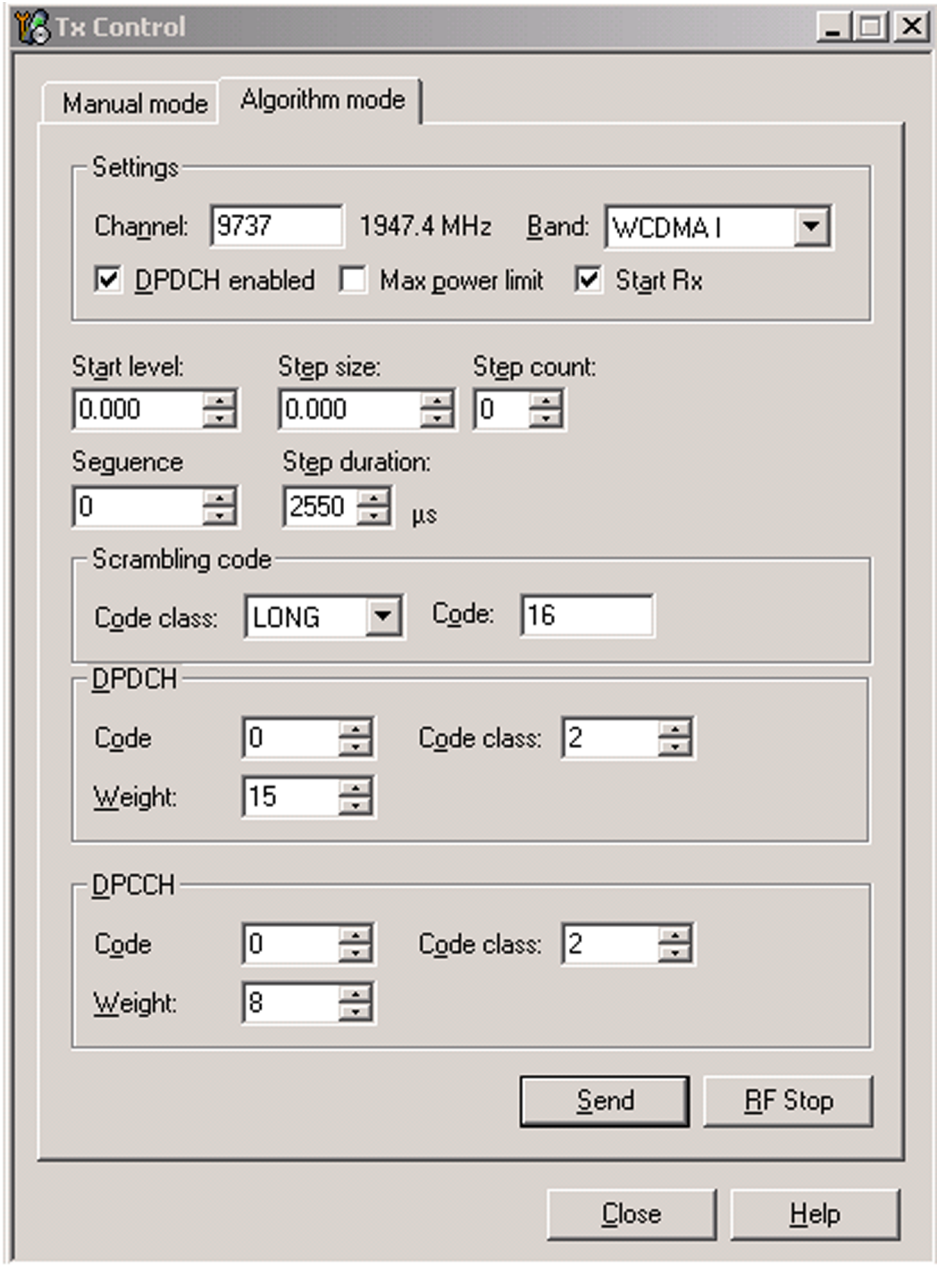

4. Click **Send** to enable the settings and activate TX.
   If settings are changed (eg. new channel), you have to click **RF Stop** and **Send** again.

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Bluetooth and FM radio

Bluetooth troubleshooting

Troubleshooting flow

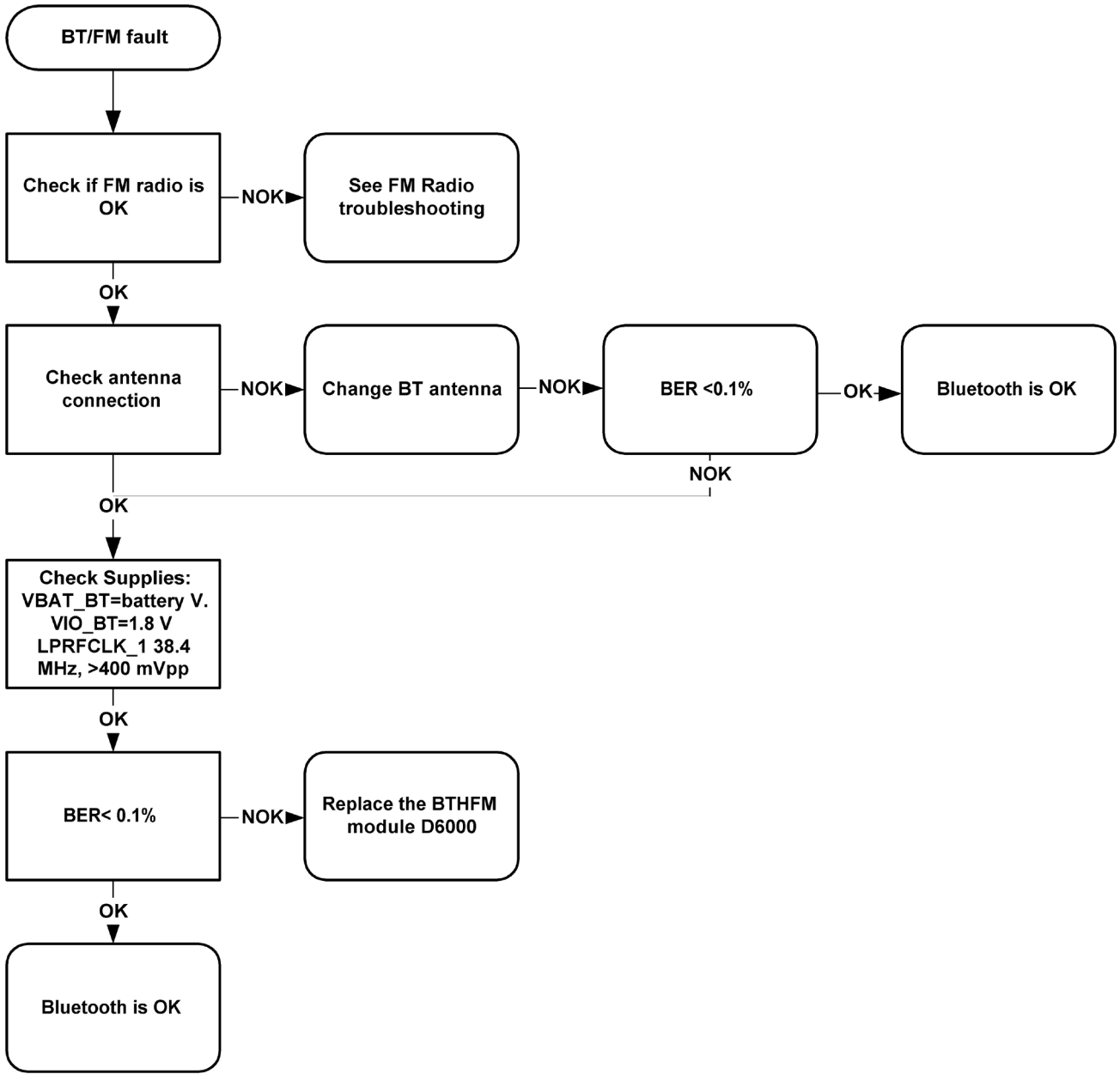

Figure 50 Troubleshooting diagram: Bluetooth

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FM radio troubleshooting

Troubleshooting flow

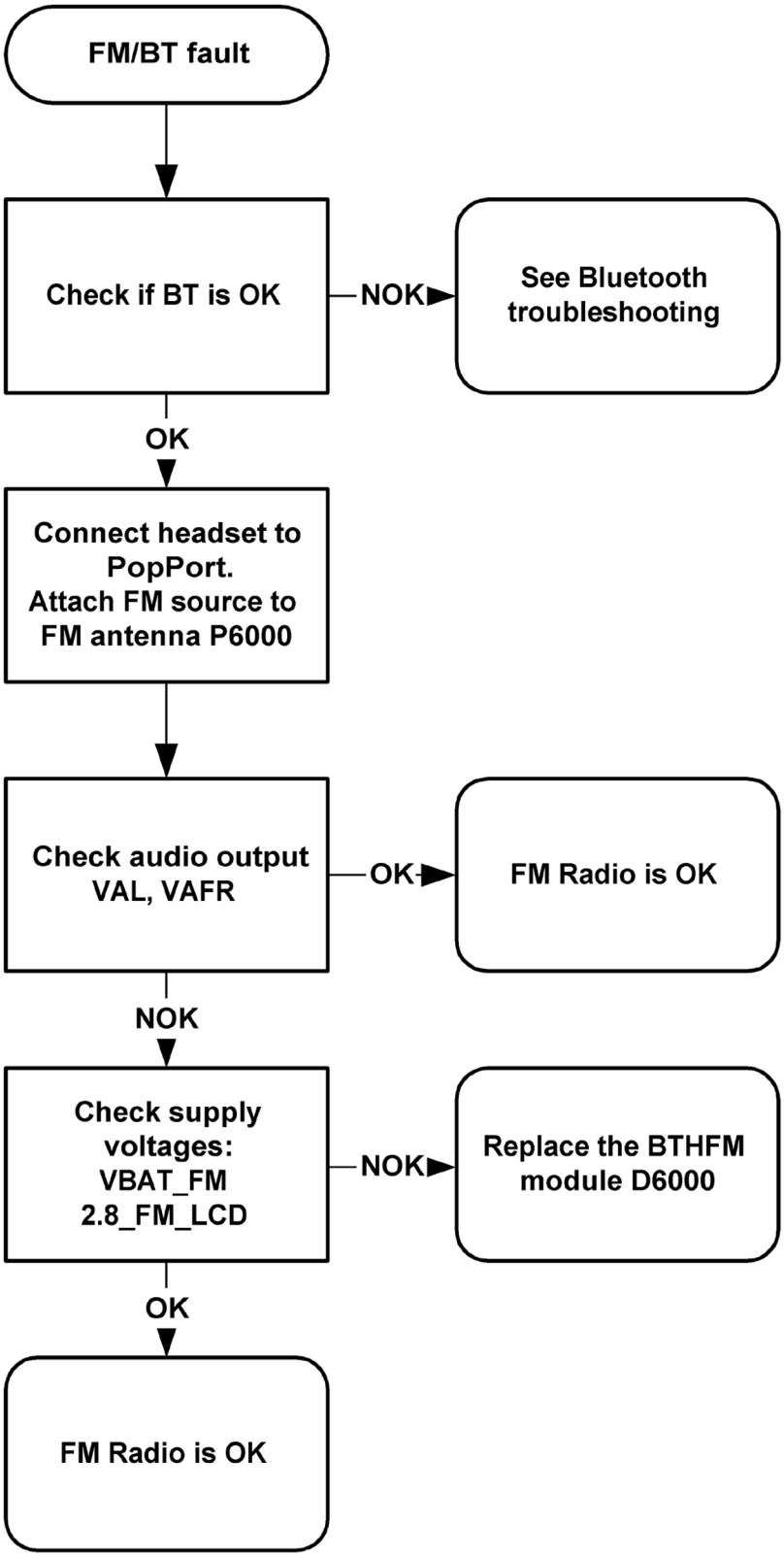

Figure 51 Troubleshooting diagram: FM radio

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8 — System Module

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Introduction

Phone description

RAP3G is the main digital baseband ASIC in the phone. It contains functionality for both WCDMA and GSM EDGE. Golden eye (Hardware accelerator) is used as a co-processor.

N2200 (AVILMA) is mainly the audio ASIC in the phone and N2300 (BETTY) is basically the energy management controller for the phone.

Bluetooth and FM radio are physically integrated in one single ASIC.

Key components

Function	Description	Item ref
Baseband ASIC	AVILMA BETTY	N2200 N2300
RF ASIC	Ahneus	N7505
Processor	RAP3G	D2800
Co-processor	Golden Eye hardware accelerator	N3400
PA GSM	Front end module (FEM), quad band	N7520
PA WCDMA		N7540
Oscillators	VCTCXO Balun GSM Balum WCDMA	G7501 T7502 T7580
Memories	512 Mbit NOR + 128 Mbit SDRAM Combo (Stacked with RAP3G) SDRAM 64 MB	D2801 D3400
Back-up battery	RTC back-up battery 311	G2200
FM radio	BTHFM1.0 module	D6000
Bluetooth	BTHFM1.0 module	D6000
IrDA	IrDA 1.15 Mbps	N2600
Fold switch	Hall IC switch/position sensor	N2550
Battery	BP-5M	
Battery connector	Tabby blade interface	X2070
BTB connector	Coax board-to-board connector	Main: X3500, Top: X3551
RF connector		X7800

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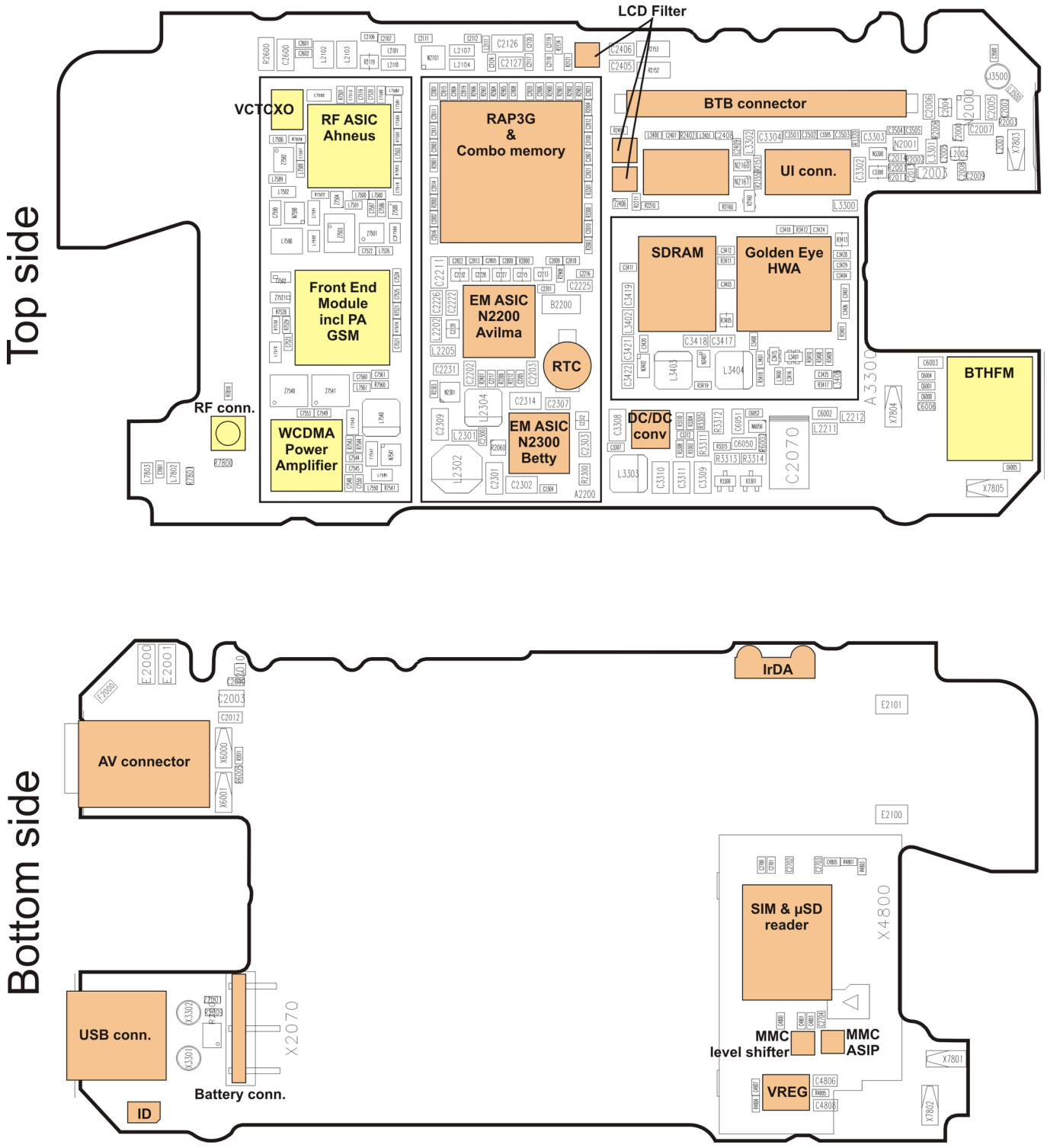
Key component placement



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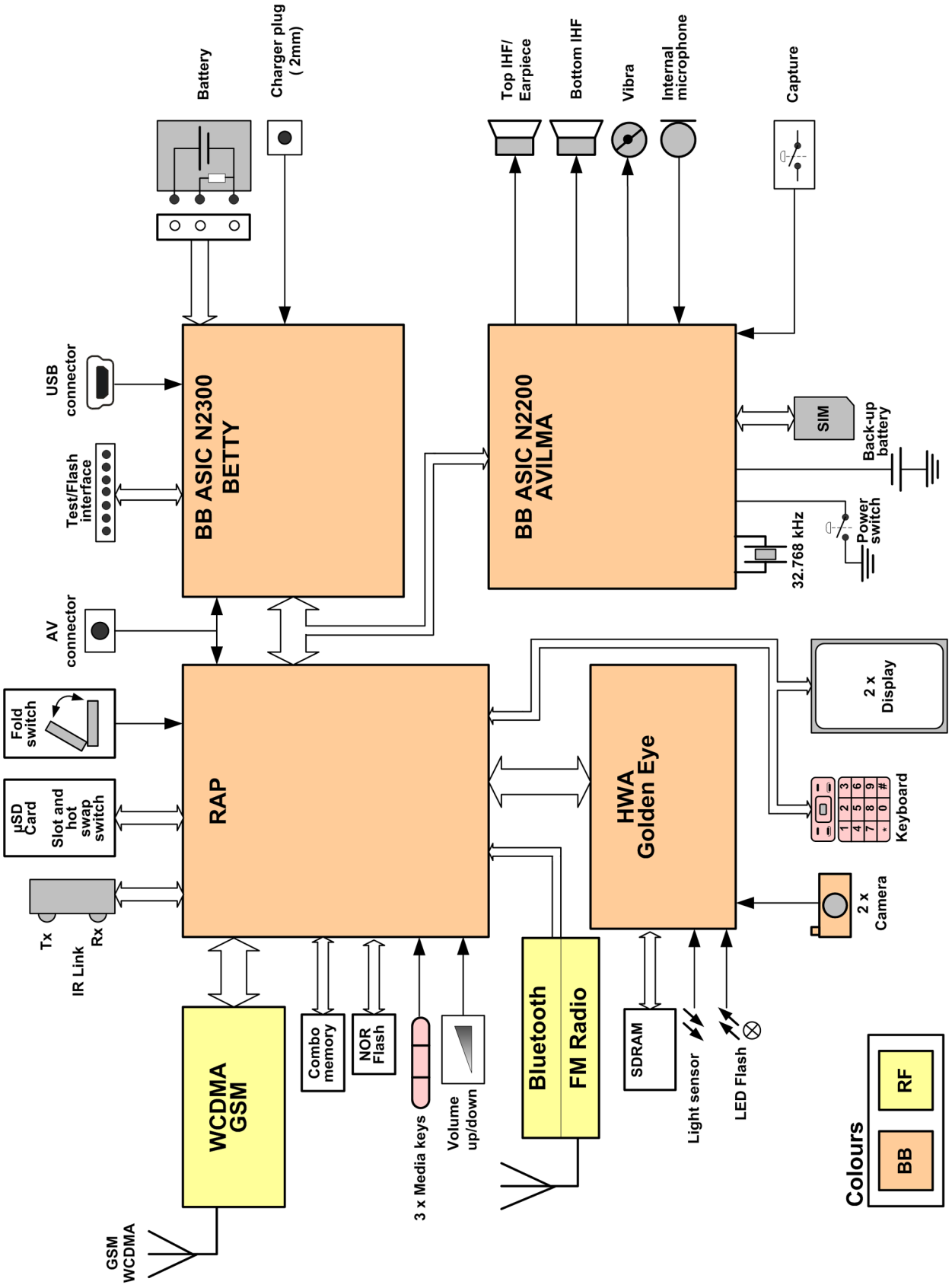
System module block diagram



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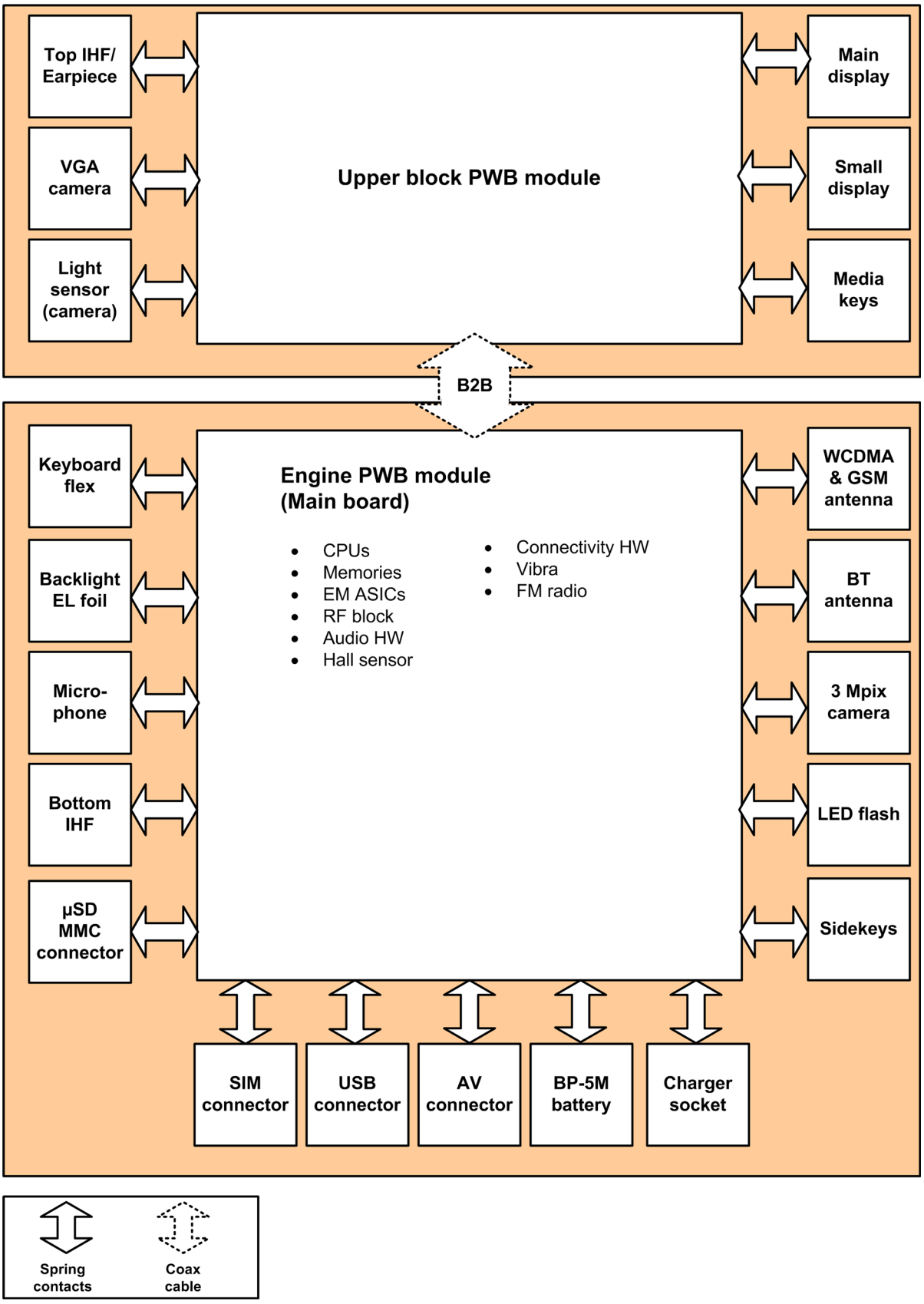
Board and module connections



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Energy management

Battery and charging

BP-5M battery

The phone is powered by a 3-pole BP-5M S-pack 900 mAh battery. The three poles are named VBAT, BSI and GND where the BSI line is used to recognize the battery capacity. This is done by means of an internal battery pull down resistor.

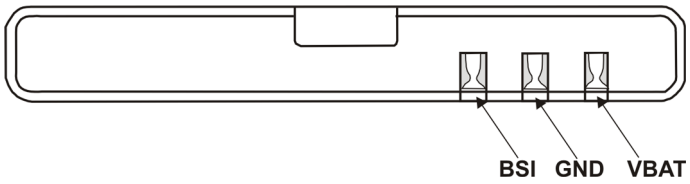

Figure 52 Battery pin order

The battery temperature is estimated by measuring separate battery temperature NTC via the BTEMP line. This is located on the main PWB, at the place where the phone temperature is closest to the battery temperature.

Battery connector

The battery connector is a blade connector. It has three blades;

- BSI (Battery size indicator)
- GND (Ground)
- VBAT (Battery voltage)

The BSI line is used to recognize the battery capacity by a battery internal pull down resistor.

Figure 53 Blade battery connector

Charging

This phone is charged through the smaller Nokia standard interface (2.0 mm plug). The wider standard charger (3.5 mm) can be used together with the CA-44 charger adapter.

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Figure 54 Small (left) and wide (right) charger plugs

Charging is controlled by energy management, and external components are needed to protect the baseband module against EMC, reverse polarity and transient frequency deviation.

Normal and extreme voltages

Energy management is mainly carried out in the two Application Specific Integrated Circuits (ASICs) N2300 BETTY and N2200 AVILMA. These two circuits contains a number of regulators. In addition there are some external regulators too.

In the table below normal and extreme voltages are shown when a BP-5M S-pack battery is used.

Table 12 Nominal voltages

Voltage	Voltage [V]	Condition
General Conditions		
Nominal voltage	3.700	
Lower extreme voltage	3.145	
Higher extreme voltage (fast charging)	4.230	
HW Shutdown Voltages		
Vmstr+	2.1 ± 0.1	Off to on
Vmstr-	1.9 ± 0.1	On to off
SW Shutdown Voltages		
Sw shutdown	3.1	In call
Sw shutdown	3.2	In idle
Min Operating Voltage		
Vcoff+	2.9 ± 0.1	Off to on
Vcoff-	2.6 ± 0.1	On to off

Power key and system power-up

When the battery is placed in the phone the power key circuits are energized. When the power key is pressed, the system boots up (if an adequate battery voltage is present).

Power down can be initiated by pressing the power key again (the system is powered down with the aid of SW). The power key is connected to EM ASIC N2200 (AVILMA) via PWRONX signal.

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Modes of operation

Mode	Description
NO_SUPPLY	(dead) mode means that the main battery is not present or its voltage is too low (below N2200 AVILMA master reset threshold) and that the back-up battery voltage is too low.
BACK_UP	The main battery is not present or its voltage is too low but back-up battery voltage is adequate and the 32 kHz oscillator is running (RTC is on).
PWR_OFF	In this mode (warm), the main battery is present and its voltage is over N2300 BETTY master reset threshold. All regulators are disabled, PurX is on low state, the RTC is on and the oscillator is on. PWR_OFF (cold) mode is almost the same as PWR_OFF (warm), but the RTC and the oscillator are off.
RESET	RESET mode is a synonym for start-up sequence. RESET mode uses 32 kHz clock to count the REST mode delay (typically 16ms).
SLEEP	SLEEP mode is entered only from PWR_ON mode with the aid of SW when the system's activity is low.
FLASHING	FLASHING mode is for SW downloading.

Clocking scheme

In BB5.0, two main clocks are provided to the system: 38.4MHz RF clock produced by VCTCXO in RF section and 32.768kHz sleep clock produced by EM ASIC N2200 with an external crystal.

32 k Sleep Clock is always powered on after startup. Sleep clock is used by RAP for low-power operation.

SMPS Clk is 2.4 MHz clock line from RAP to EM ASIC N2300. In deep sleep mode, when VCTCXO is off, this signal is set to '0'-state.

BT Clk is 38.4 MHz signal from Ahneus ASIC to BT module.

CLK600. The clock source is an internal RC oscillator in EM ASIC N2300 (during the power-up sequence) or RAPIDO SMPS Clk.

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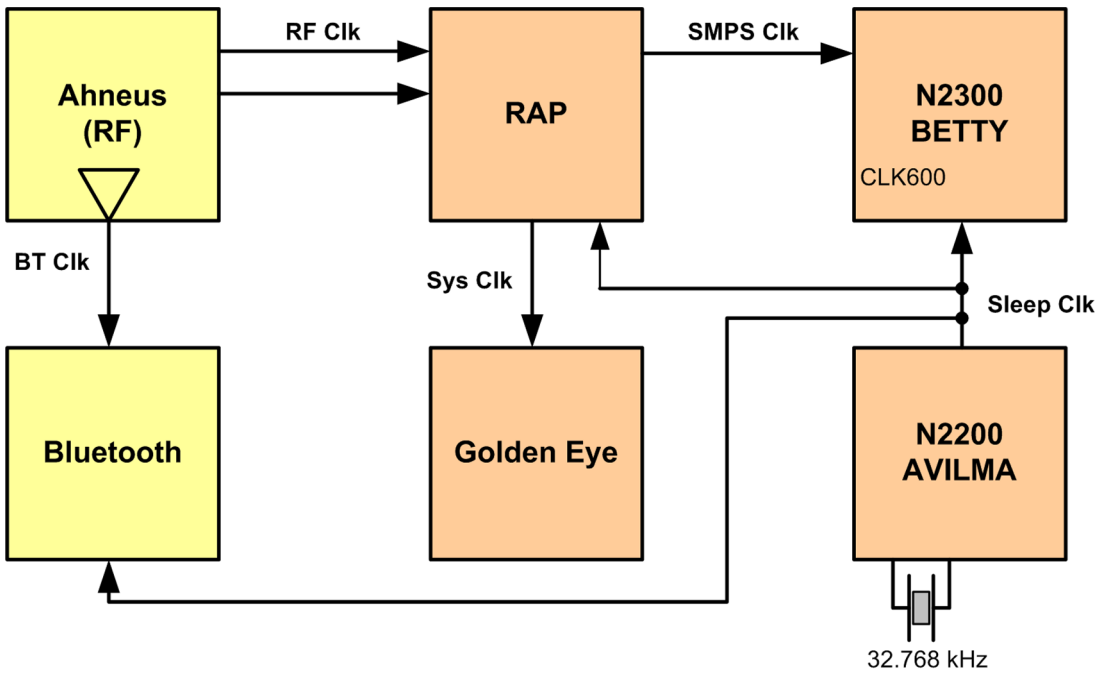


Figure 55 Clocking scheme

USB, SIM, MMC

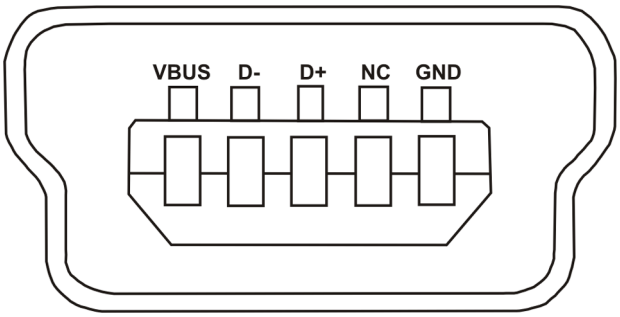
USB

USB (Universal Serial Bus) provides a wired connectivity between a PC and peripheral devices. It is a differential serial bus.

USB 2.0 is supported with full speed (12 Mbps).

Hot swap is supported, which means that USB devices may be plugged in/out at any time.

This phone is provided with a specific connector for mini USB.



SIM interface

The device has one SIM (Subscriber Identification Module) interface. It is only accessible if battery is removed. The SIM interface consists of an internal interface between RAP and EM ASIC (N2200), and of an external interface between N2200 and SIM contacts.

The SIM IF is shown in the following figure:

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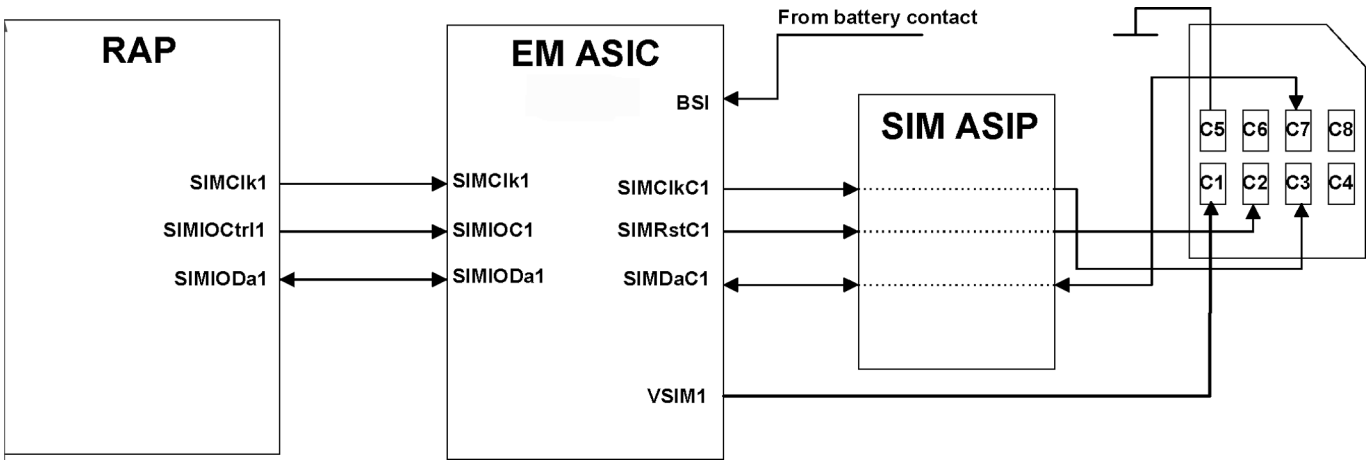
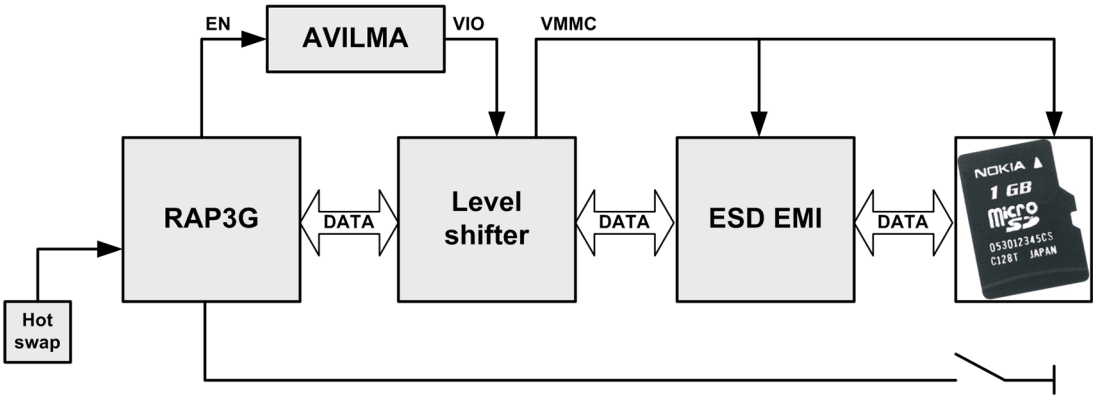


Figure 56 SIM interface

The EM ASIC handles the detection of the SIM card. The detection method is based in the BSI line. Because of the location of the SIM card, removing the battery causes a quick power down of the SIM IF.

The EM ASIC SIM1 interface supports both 1.8 V and 3.0 V SIM cards. The SIM interface voltage is first 1.8 V when the SIM card is inserted, and if the card does not response to the ATR a 3 V interface voltage is used.

µSD card interface



The µSD card is connected to the engine by an external level shifter and ESD protection filter. Supplied voltages:

- VMMC: 2.85 V (from level shifter)
- VIO: 1.8 V (from AVILMA)

The card removal is detected by a push detect switch.

Hot swap is supported, which means that the card may be plugged in/out at any time, without removing the battery.

Camera

The **main camera** uses a 3.0 megapixel camera module. It has a dedicated capture key and a LED flash.

The **small camera** is a VGA camera. This one is mainly used for video calls, and is used together with the light sensor.

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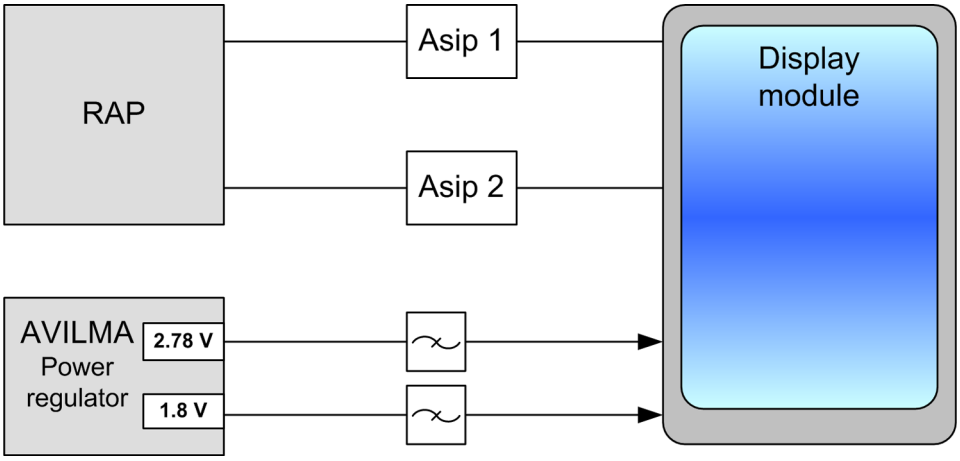
User interface

Display module

Display module

This phone has two displays; one main display and one small display. They are both included in the same module and cannot be replaced separately. It does not require any tuning in service.

The interconnection between the LCD module and the engine is implemented with a 24-pin board-to-board connector.



Keyboard and other keys

Most keys are placed on the lower flex - the separate lower (keypad) flex;

- Numeric keys
- Soft keys L/R
- Navigation keys (4) with Select in the centre
- Send and End keys
- Dual function Capture/Auto focus key (i.e. two keys)
- Volume up/down keys
- Power key

Also, three media keys are placed on the top board.

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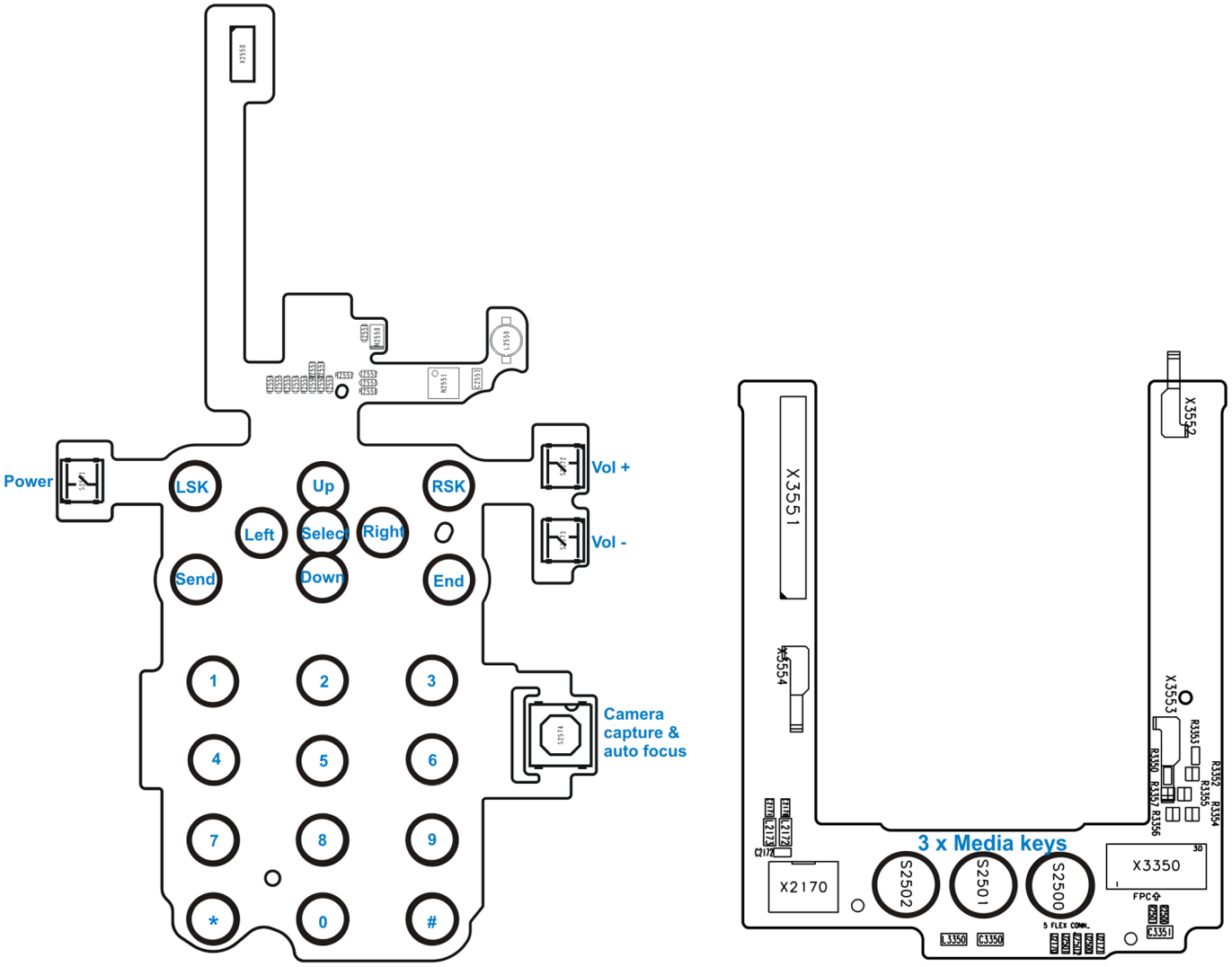

Figure 57 Keyboard layout

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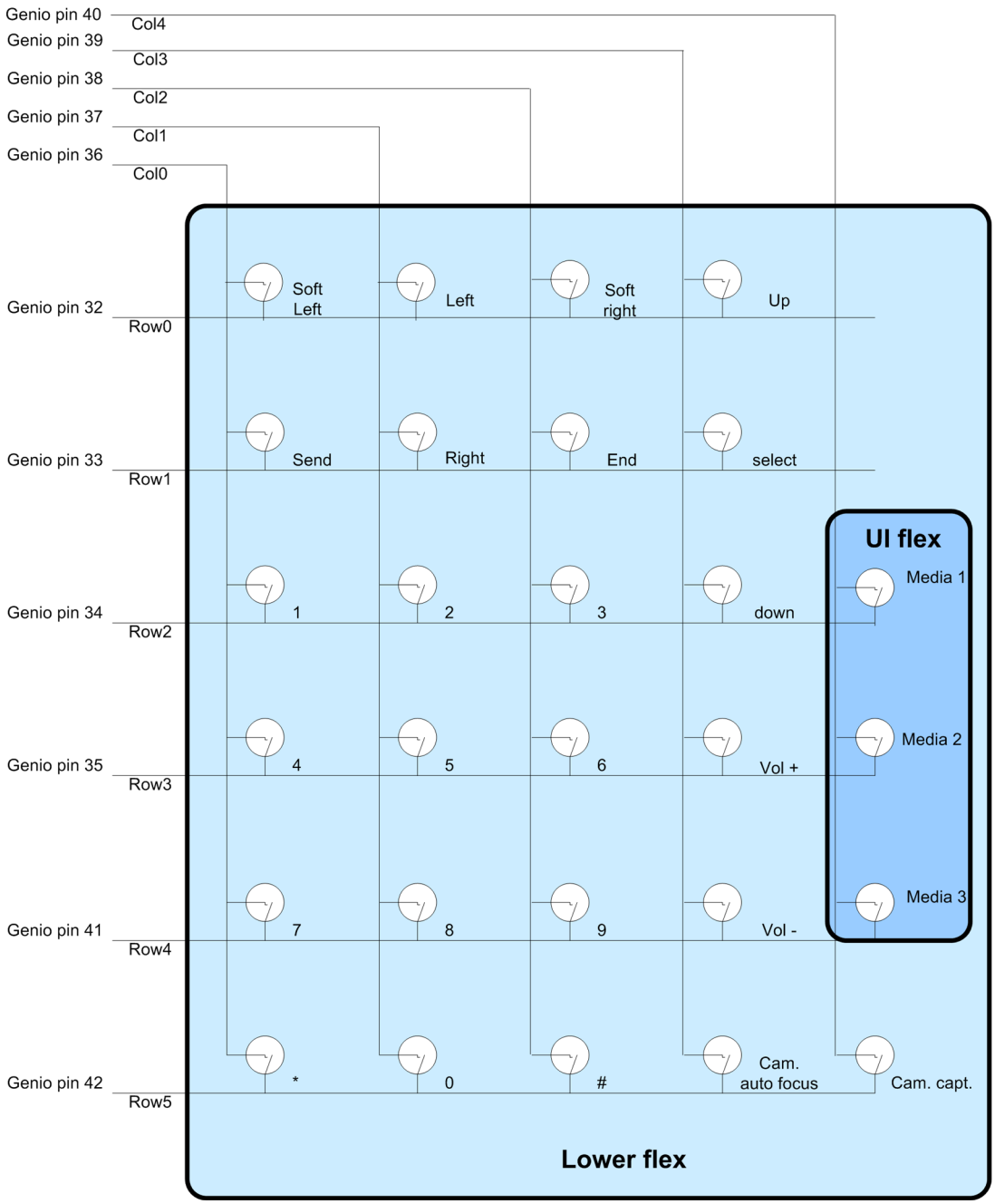

Backlight and illumination

There is backlight illuminating the display.

Behind the keypad there is an electroluminescent (EL) foil, giving the keys a coloured backlight when lit.

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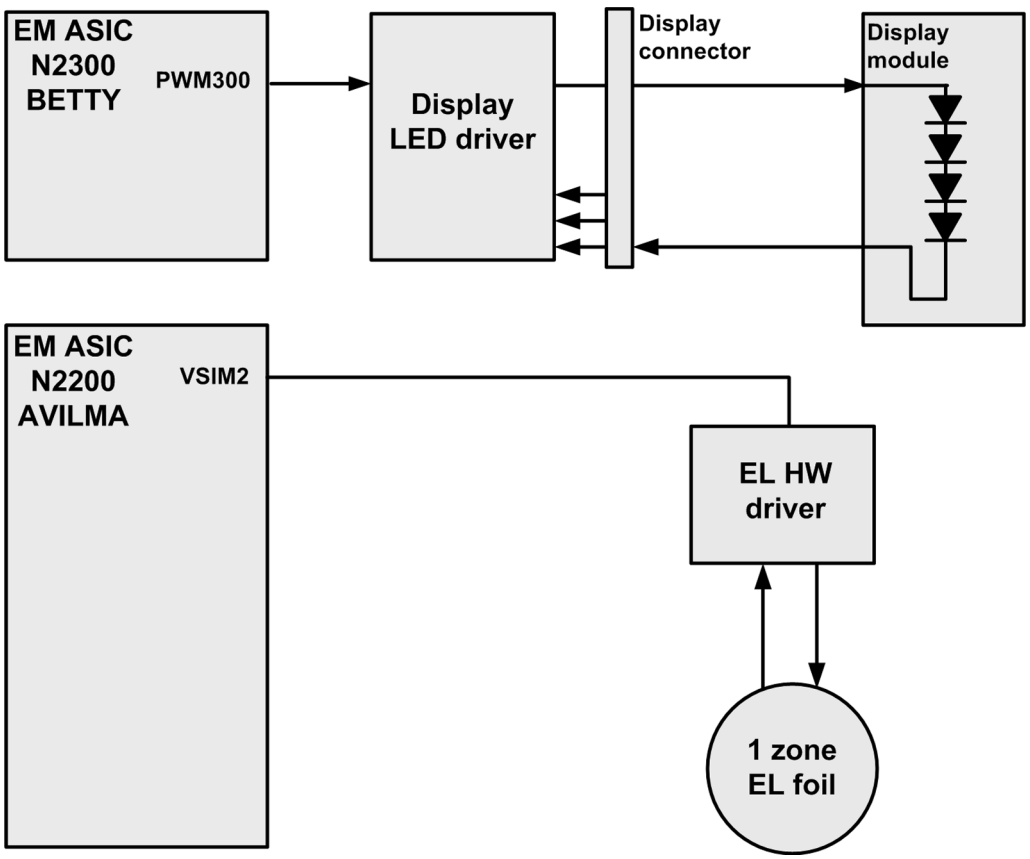

Ambient light sensor (ALS)

The ambient light sensor (ALS) is located on the top part of the phone, placed above the small (front) camera. It consists of

- a lightguide (part of cover)
- a phototransistor + a resistor + a decoupling capacitor (last one not important for ALS operation)
- an NTC resistor + other resistors
- EM ASIC N2200

The ambient light sensor is used to control the lights of the phone:

- Keyboard lightning is switched on only when environment is dark/dim
- Display backlights are dimmed when environment is dark/dim.

The ambient light sensor itself is a photo transistor, which is temperature compensated by an NTC resistor. EM ASIC 2200 with its ADC reads the light sensor and temperature values.

Fold switch

The detection of the position of the fold is made through a Hall sensor and a magnet. The magnet is positioned in the upper block.

When the fold is opened, the applied magnetic field is high. This is sensed by an internal switch, also connected to GND. When the fold is closed, the Hall sensor is fluxed by magnetic field.

Audio concept

Audio concept

The functional core of the audio hardware is built around two EM ASICs; N2300 BETTY and N2200 AVILMA.

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N2200 provides an interface for the trancducers and the AV connector. Integrated hands free (IHF) stereo speakers are driven by a D-class audio amplifier.

There are three audio transducers:

- 2 dynamic speakers (IHF and earpiece)
- 1 microphone module

N2200 also provides an output for the vibra motor.

All external audio accessories are connected to the specific audio connector.

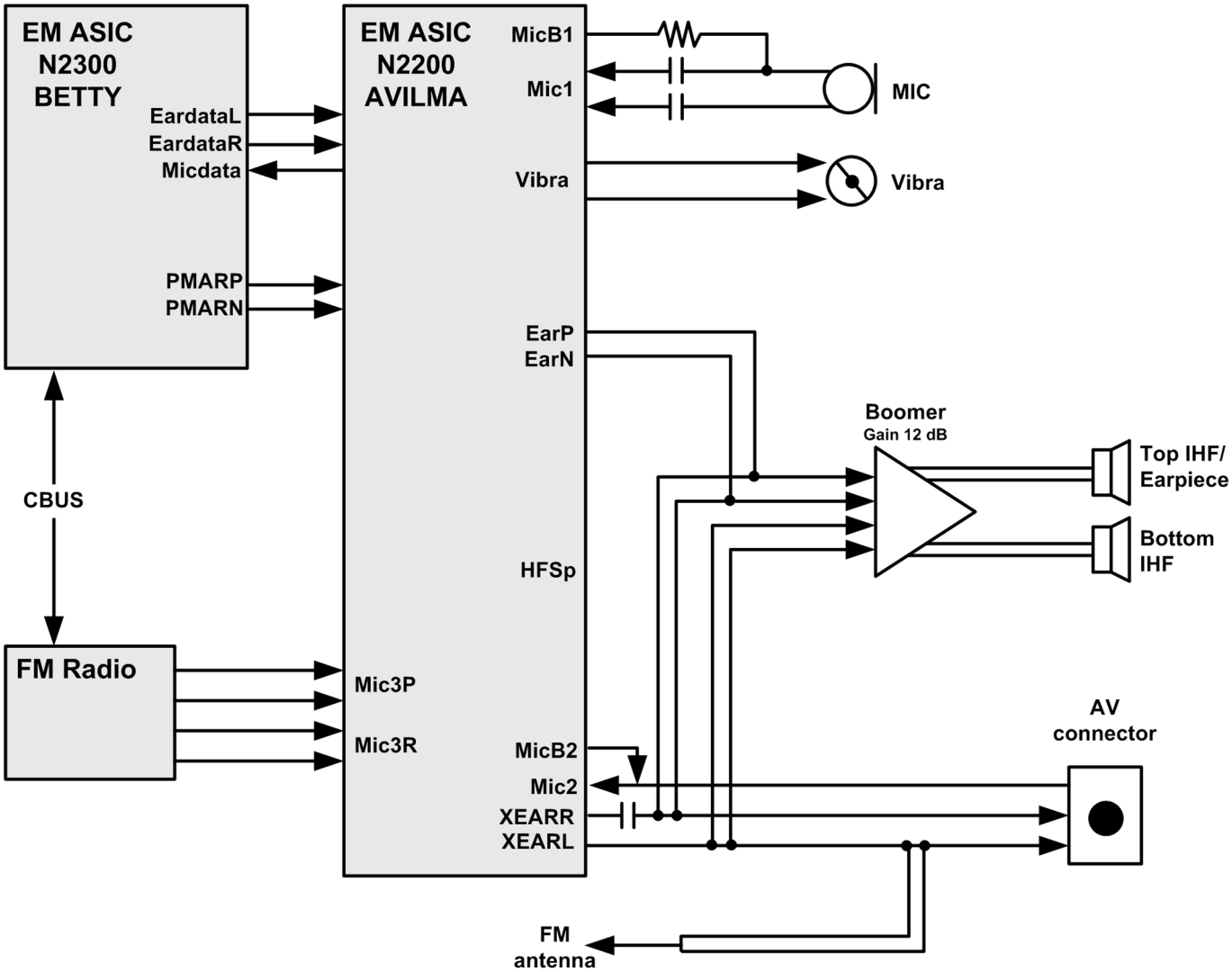

Figure 58 Audio block diagram

Internal audio

The internal audio components are used in these modes:

	Hand portable (HP) mode	Internal hands free (IHF) mode
Microphone	X	X
Earpiece	X	X
Speaker		X

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AV connector

Headsets and other galvanic accessories are connected to the specific audio input. The accessory mode is automatically enabled/disabled when a dedicated accessory is connected/disconnected.

Note: When testing external audio through the audio connector, make sure that the specific accessory can be used with this phone!

Bluetooth and FM radio

Bluetooth

Bluetooth provides a fully digital link for communication between a master unit (the phone) and one or more slave units (e.g. a wireless headset). Data and control interface for a low power RF module is provided by the module.

The Bluetooth is physically integrated with the FM radio into one single module. From a functional point of view they, however, have nothing in common.

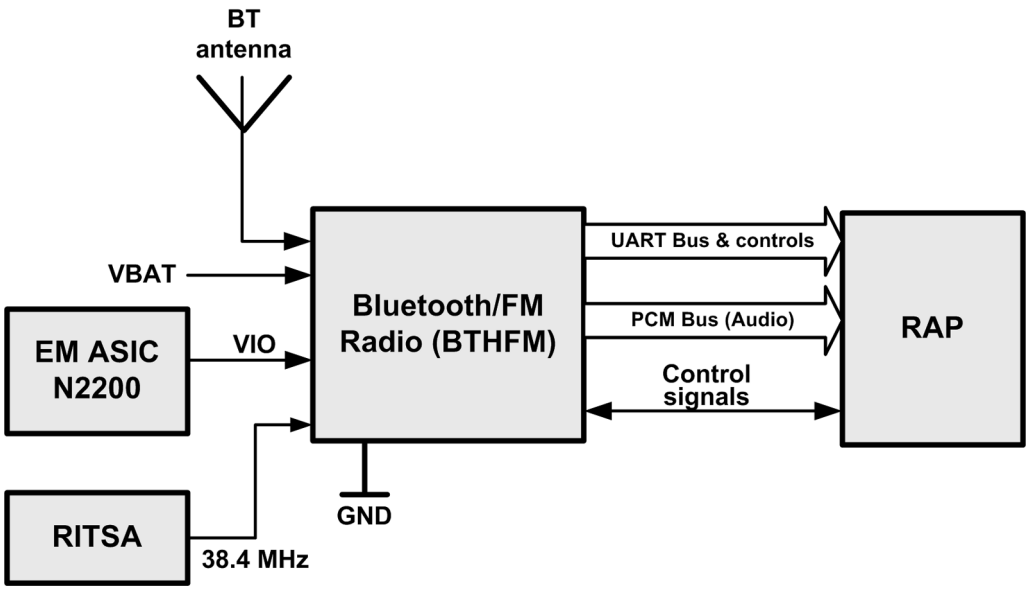

Figure 59 Bluetooth interface

The Bluetooth has a separate built in antenna and is powered by VBAT and the regulated voltage VIO. For audio applications the Bluetooth has a PCM data bus. In addition a UART (universal asynchronous receiver/transmitter) is used for data communication and controls.

FM radio

The FM radio is physically integrated with the Bluetooth into one single module. From a functional point of view they, however, have nothing in common.

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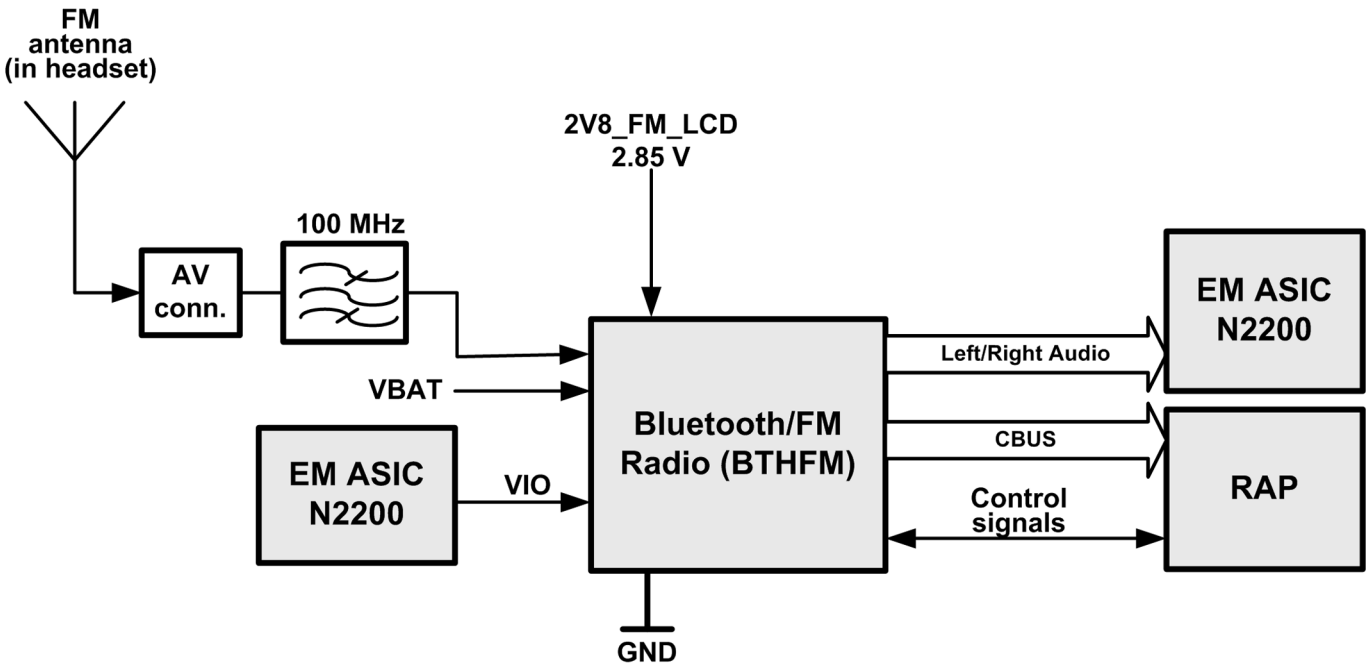

Figure 60 FM interface

The FM radio is an integrated circuit, controlled by MCU software through a serial bus interface. The wires of the headset are used as poles of the antenna, and no other antenna is needed for FM radio reception.

In addition to the Bluetooth unit the FM radio is provided with LDO (low drop out) voltage 2V8_FM_LCD.

The radio has an automatic band search function, which can search for a strong write/read signal from a certain frequency. When this is found, data is transmitted to the radio. When the signal strength is low, the EM ASIC N2200 (AVILMA) can read data, which is available until the signal is strong again.

RF description

Receiver (RX)

An analouge signal is received by the phone's antenna. The signal is converted to a digital signal and is then transferred further to the baseband (eg. to the earpiece).

The receiver functions are implemented in the RF ASIC.

Signals with different frequencies take different "ways", being handled by different components. The principle of GSM and WCDMA is the same.

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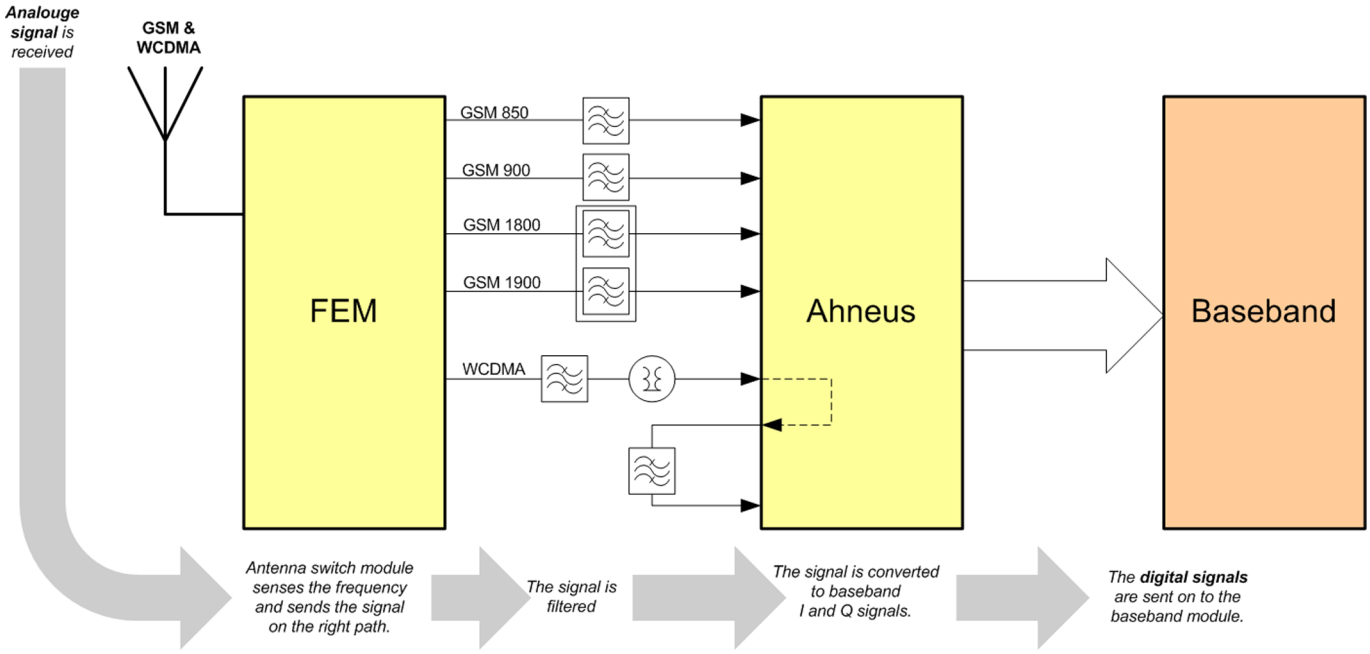
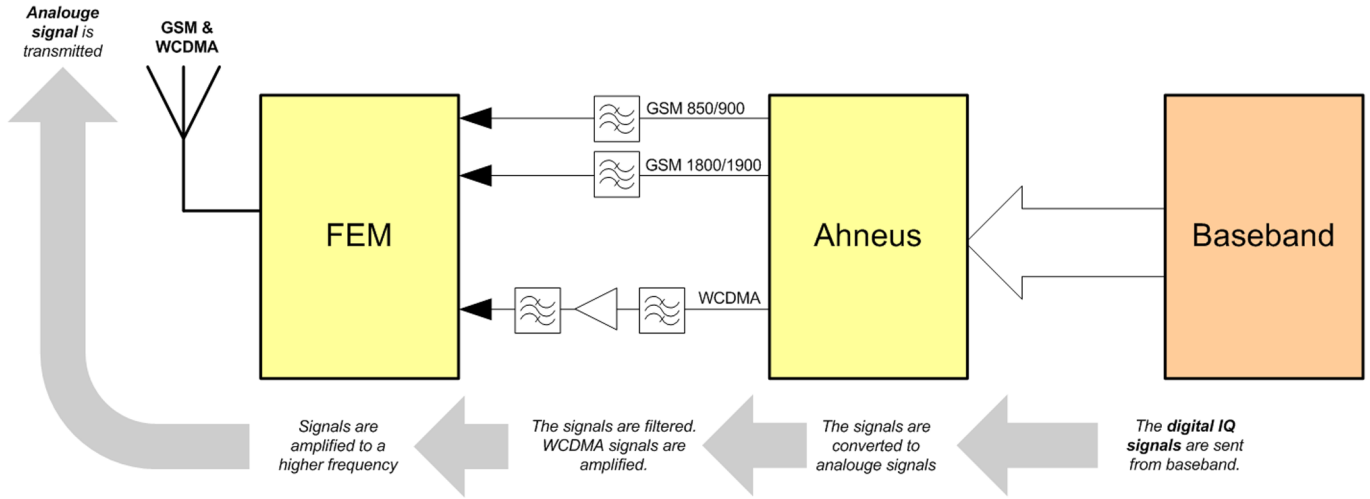


Transmitter (TX)

The digital baseband signal (eg. from the microphone) is converted to an analouge signal, which is then amplified and transmitted from the antenna. The frequency of this signal can be tuned to match the bandwith of the system in use (eg. GSM900).

The transmitter functions are implemented in the RF ASIC.

Even though the GSM and WCDMA signals pass different components, the principles of the transmission is the same.



Technical specifications

Main RF characteristics for triple GSM band and WCDMA band phones

Parameter	Unit
Cellular system	EGSM900/1800/1900 + WCDMA band I

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Parameter	Unit
RX frequency band	EGSM900: 925- 960 MHz
	GSM1800: 1805 - 1880 MHz
	GSM1900: 1930 - 1990 MHz
	WCDMA band I: 2110 - 2170 MHz
TX frequency band	GSM900: 880- 915 MHz
	GSM1800: 1710 - 1785 MHz
	GSM1900: 1850 - 1910 MHz
	WCDMA band I: 1920 - 1980 MHz
	WCDMA band IV: 1710 - 1755 MHz
Output power	EGSM900: +5 ... +32.5 dBm
	GSM1800: +0 ... +29.5 dBm
	GSM1900: +0 ... +29.5 dBm
	WCDMA band I: -50...+22.5 dBm
Number of RF channels	EGSM900: 172
	GSM1800: 375
	GSM1900: 300
	WCDMA band I: ∞
Channel spacing	GSM 200 KHz WCDMA 4.8 MHz
Number of Tx power levels	GSM850: 15
	GSM1800: 16
	GSM1900: 16
	WCDMA band I: 75

Environmental conditions

Environmental condition	Ambient temperature	Notes
Normal operation	15 ºC ... +55 ºC	Specifications fulfilled
Reduced performance	55 ºC ... +70 ºC	Operational only for short periods
Intermittent or no operation	-40 ºC ... -15 ºC and +70 ºC ... +85ºC	Operation not guaranteed but an attempt to operate will not damage the phone
No operation or storage	<-40 ºC and >+85 ºC	No storage. An attempt to operate may cause permanent damage
Charging allowed	-15 ºC ... +55 ºC	

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Environmental condition	Ambient temperature	Notes
Long term storage conditions	0 ºC ... +85 ºC	
Humidity and water resistance		Relative humidity range is 5 to 95%. Condensed or dripping water may cause intermittent malfunctions. Protection against dripping water has to be implemented in (enclosure) mechanics. Continuous dampness will cause permanent damage to the module.

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9 — Schematics

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Schematics.....9–4

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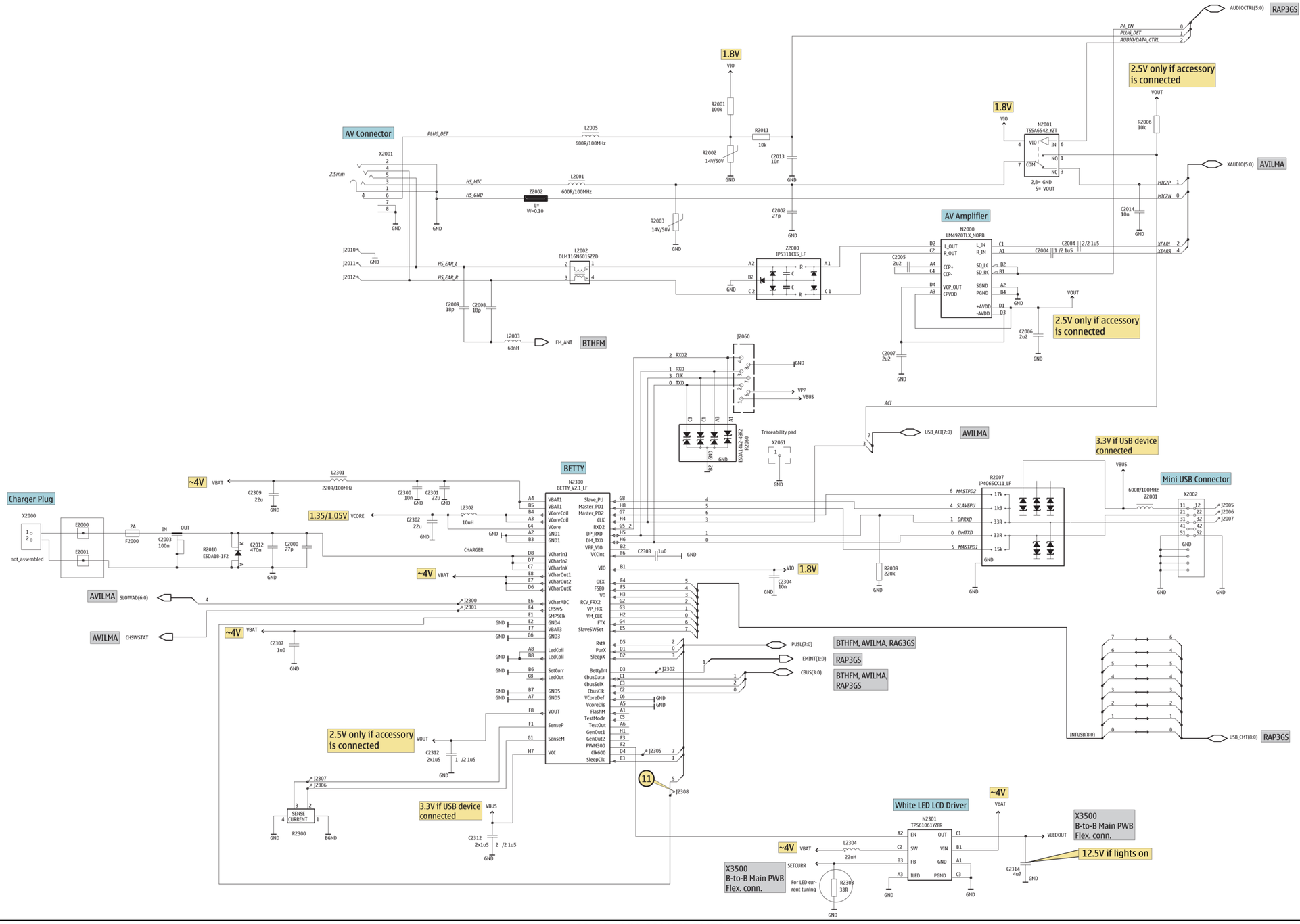
Schematics

AV connector, EM ASIC N2300 Betty, USB



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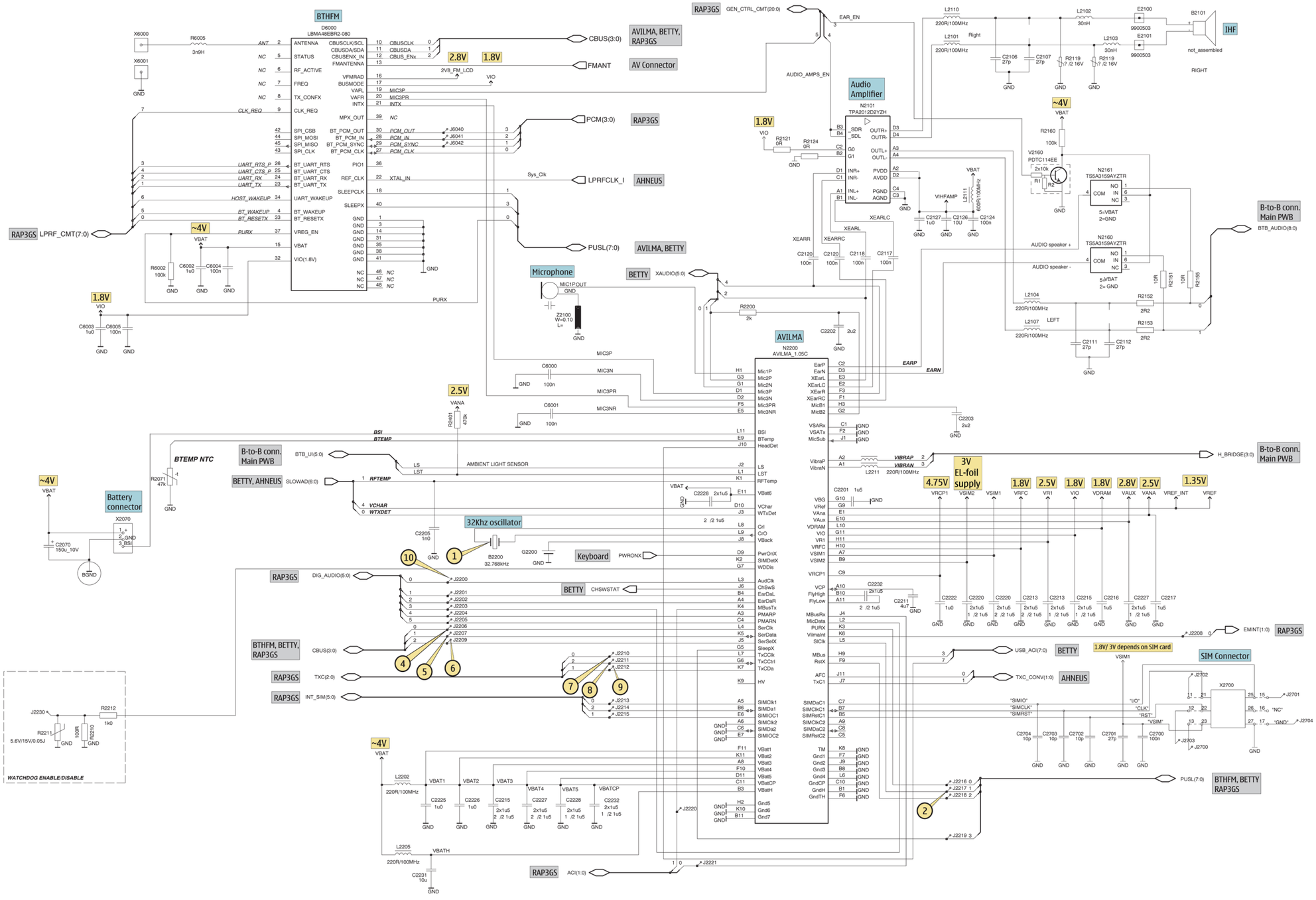
EM ASIC N2200 Avilma, Bluetooth, FM radio, SIM, Audio



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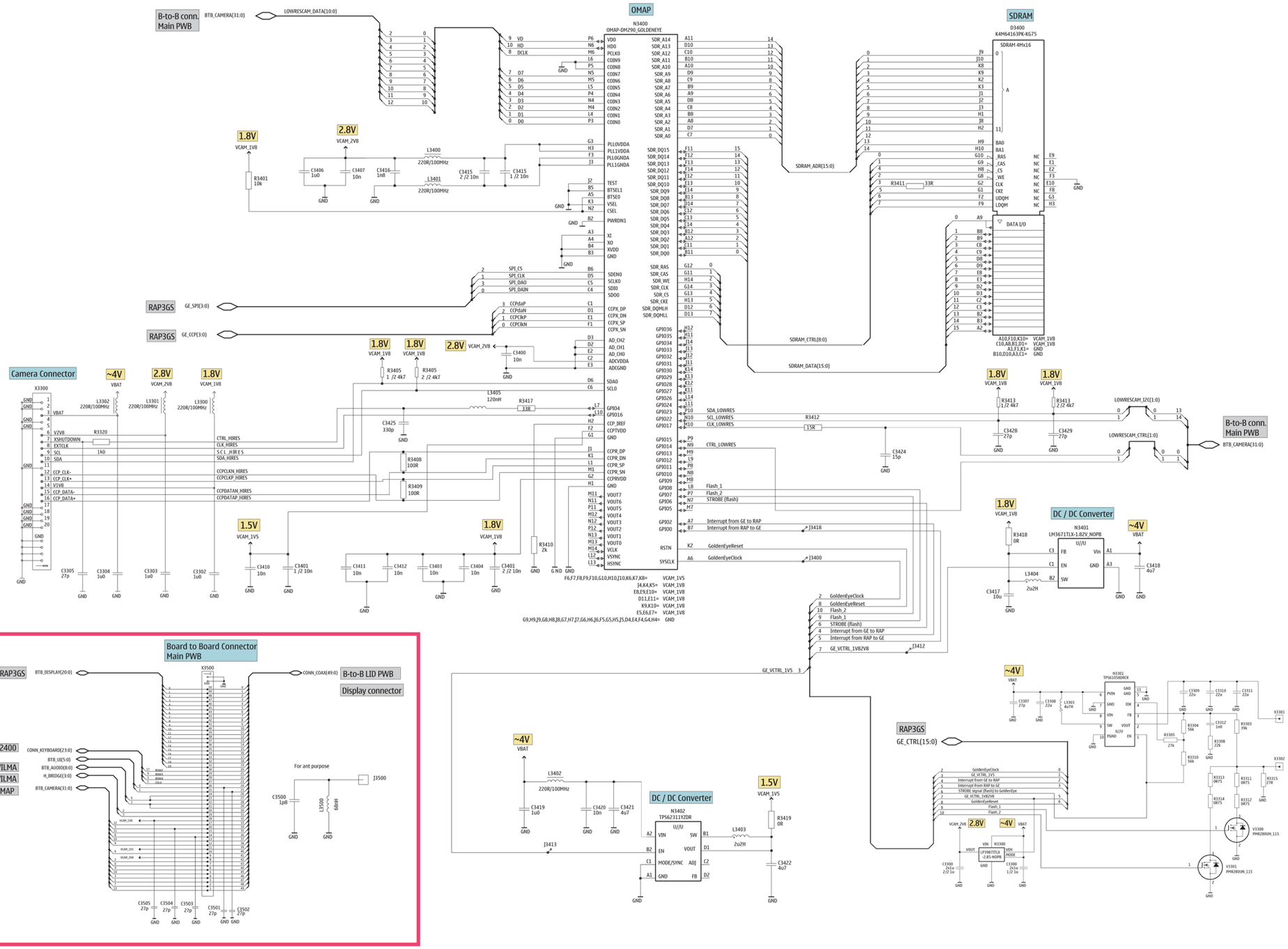
OMAP, Camera, BTB connector



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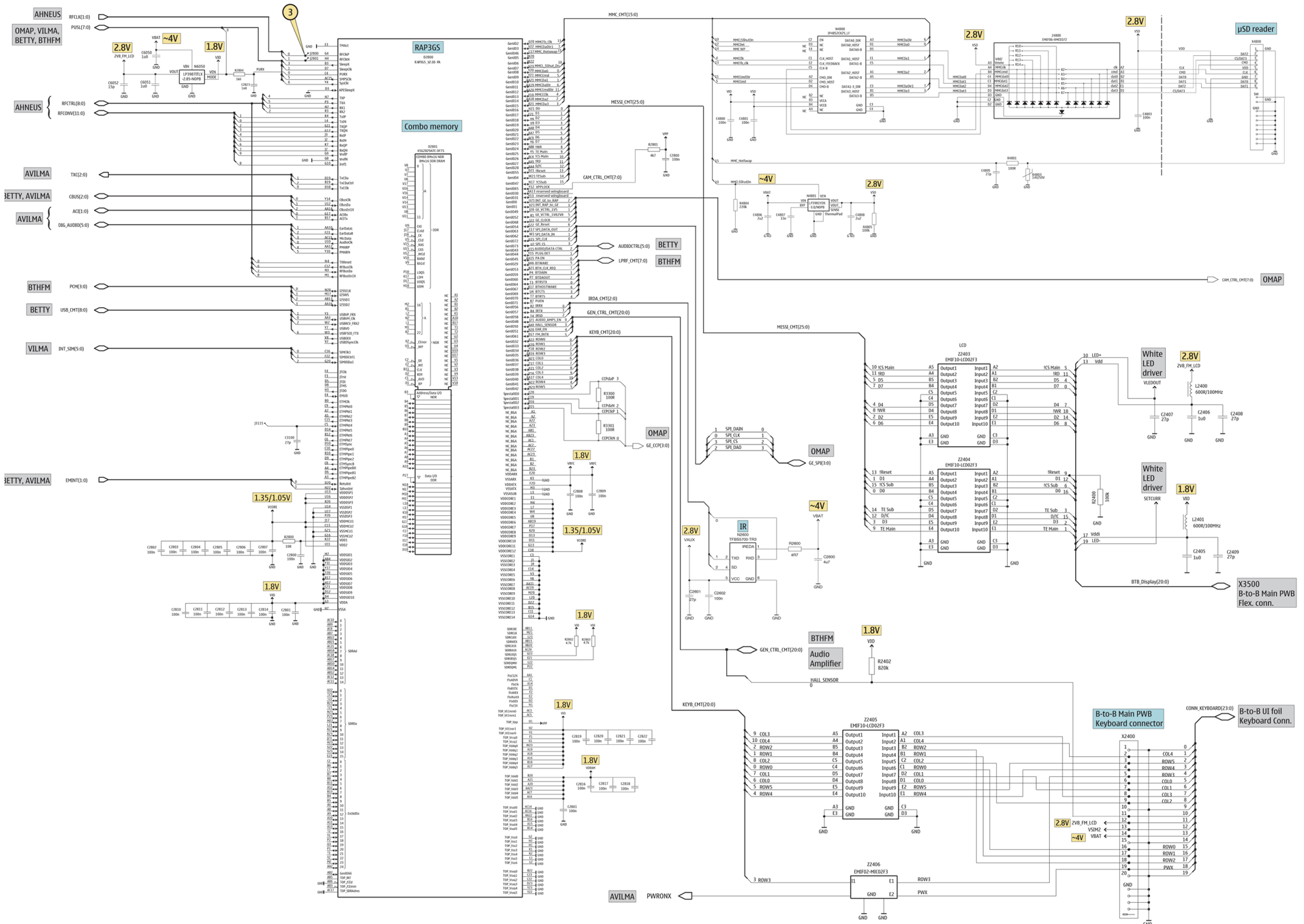
RAP3GS, Combo memory, Keyboard



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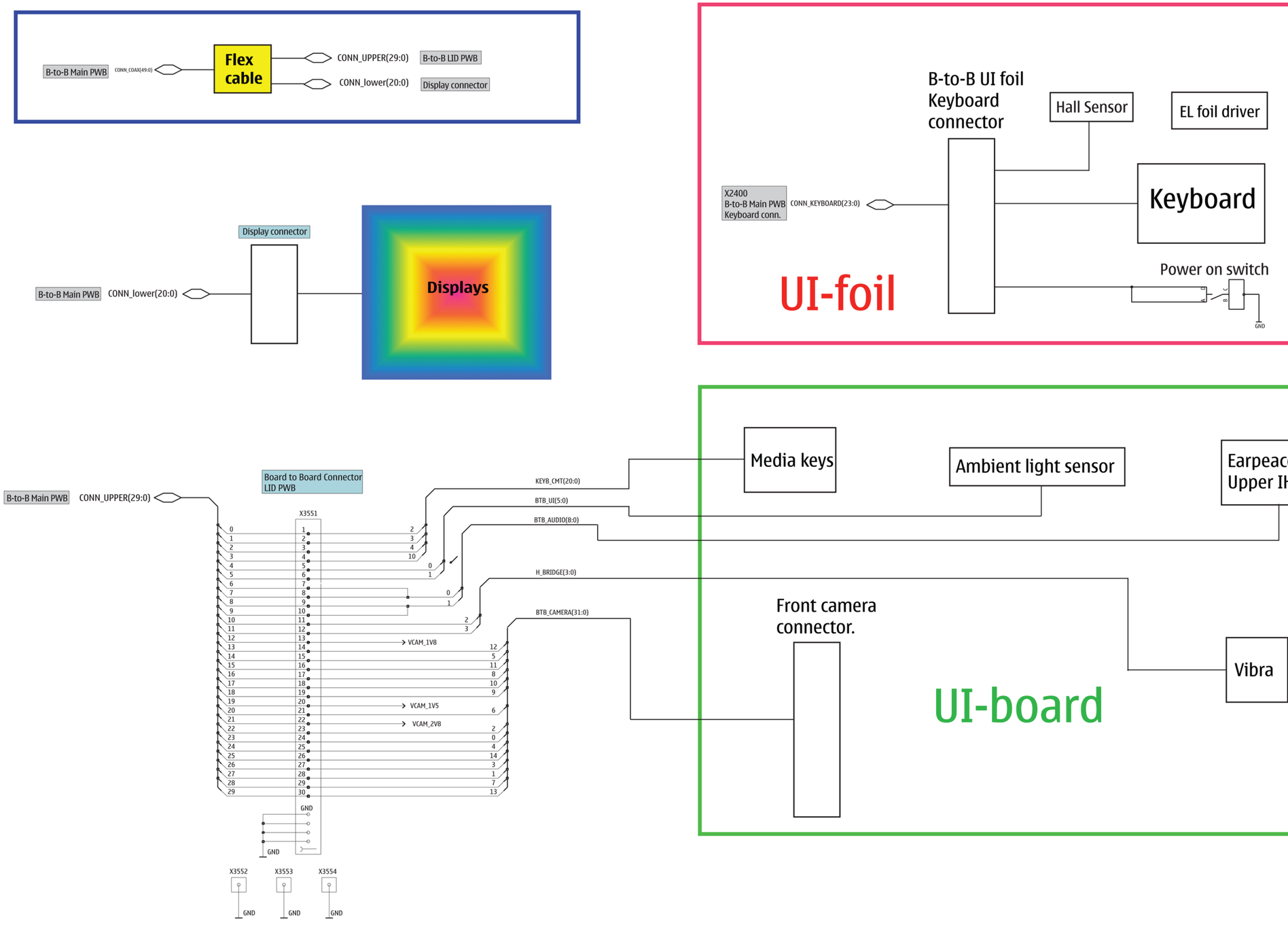
UI part



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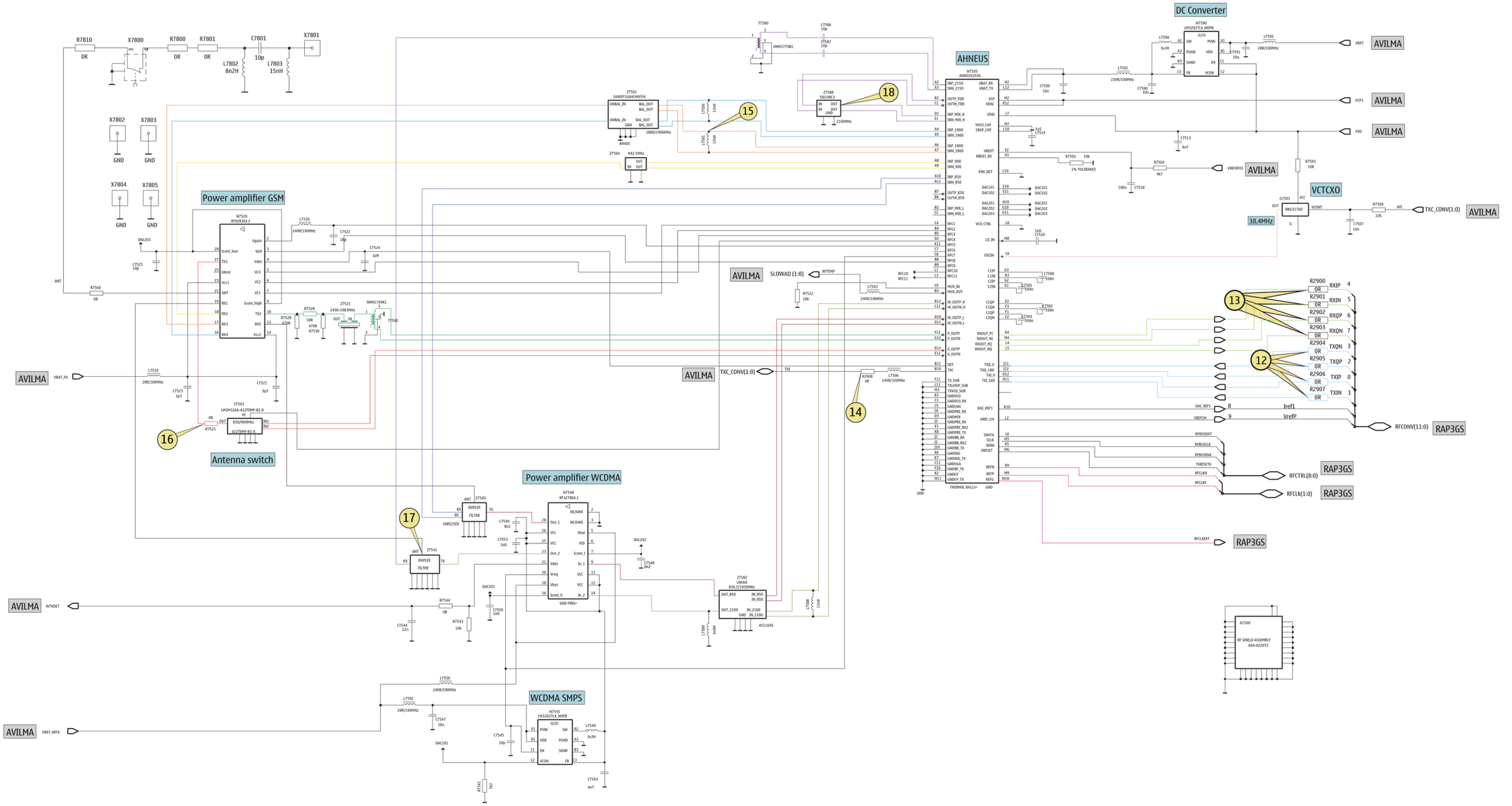
RF Part



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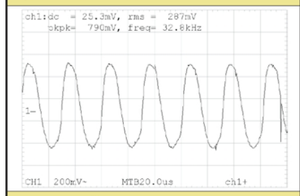
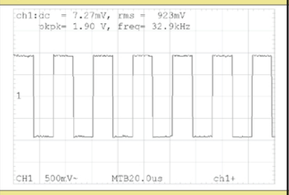
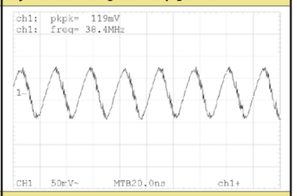
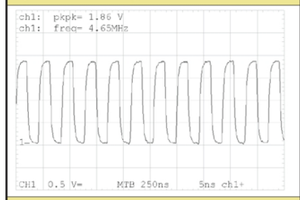
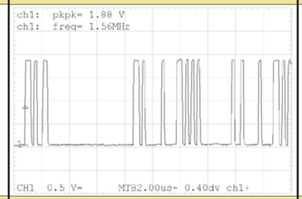
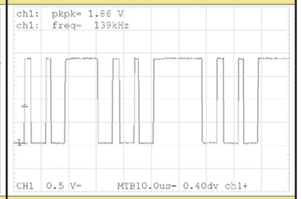
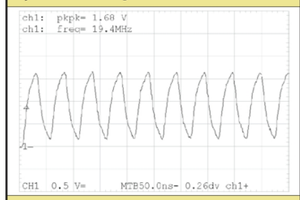
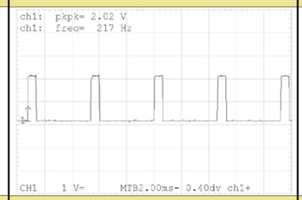
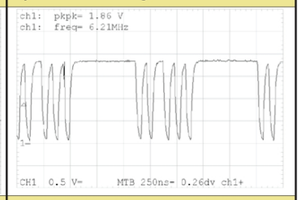
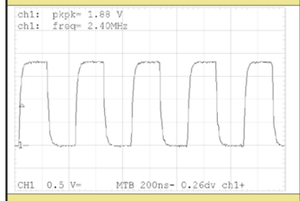
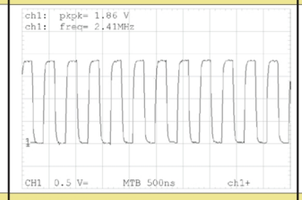
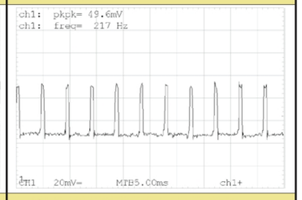
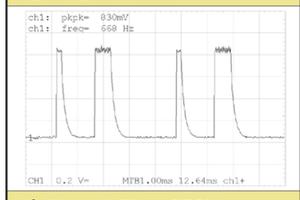
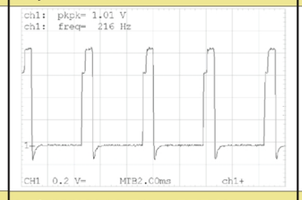
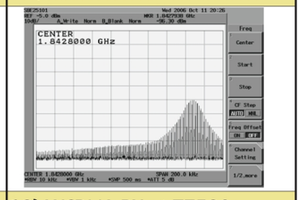
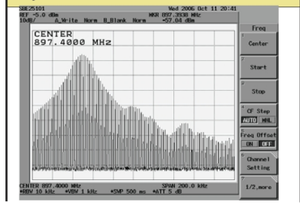
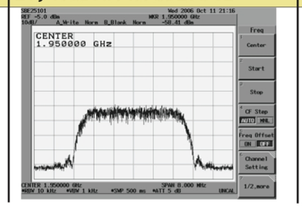
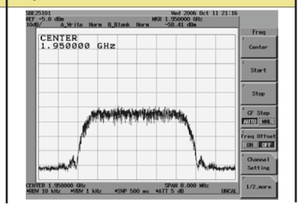
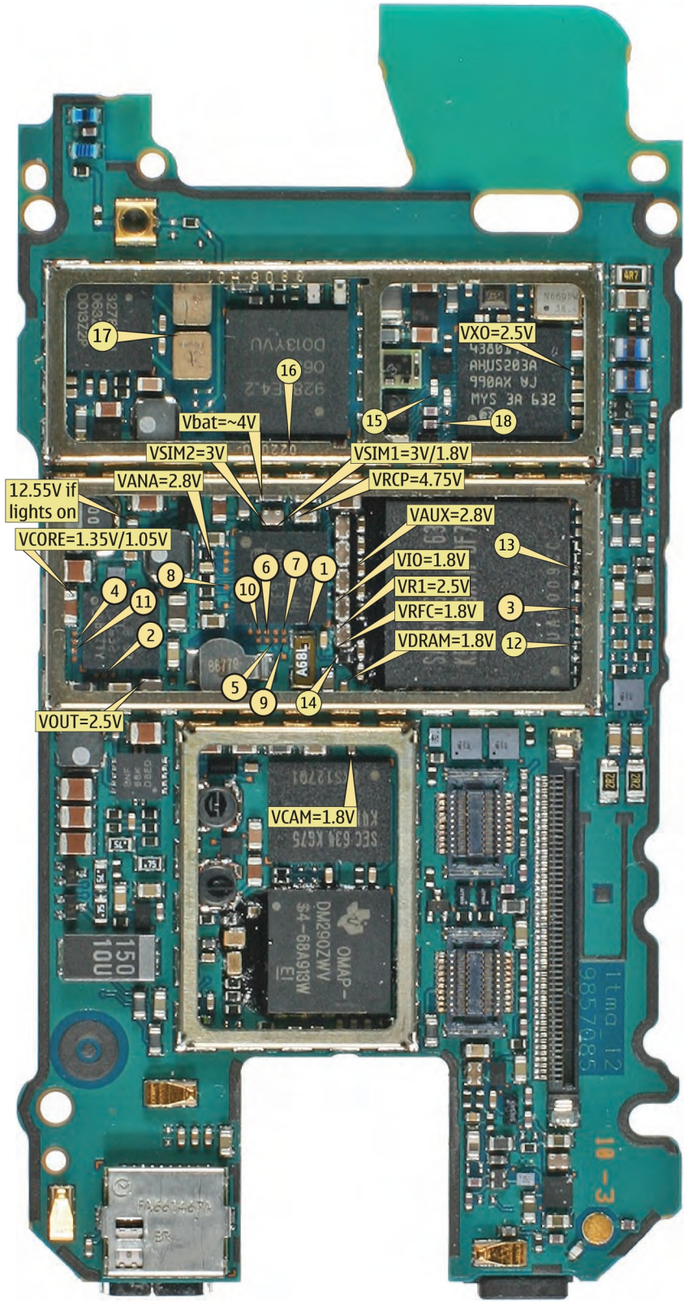
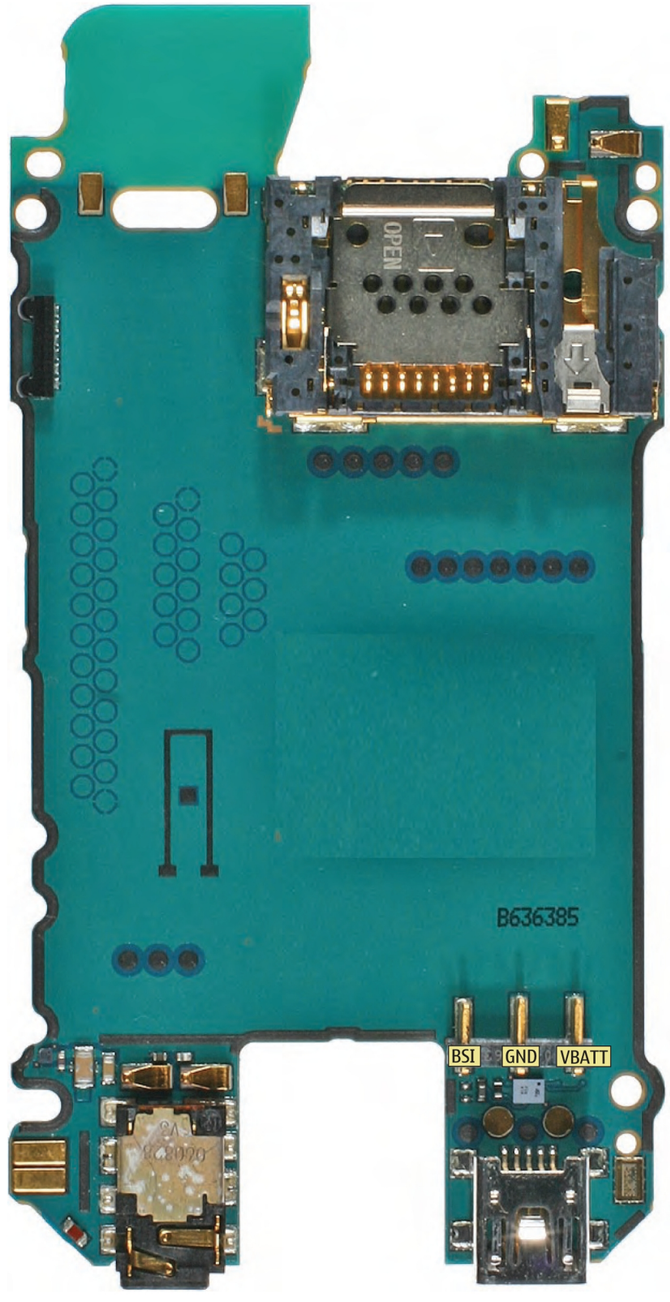
Signal overview

1) 32.768kHz at B2200	2) SLEEPClk at J2217	3) RFCLK at J2800 / J2801
		
4) CBUSClk at J2206	**5) CBUSDATA at J2207**	**6) CBUSENX at J2209**
		
7) TXCCLK at J2210	**8) TXCCTRL at J2211**	**9) TXCDATA at J2212**
		
10) AUDIOCLK at J2200	**11) SMPSCLK at J2308**	**12) TXIQ at R2904 - R2907**
		
13) RXIQ at R2900 - R2904	**14) TXC at R2908**	**15) GSM1800 RX at L7501**
		
16) GSM900 TX at R7521	**17) WCDMA TX at Z7541**	**18) WCDMA RX at T7580**
		





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Component finder

B		C2811	H8	C7524	G5	J3102	H8	N2200	I5	R3410	N4
B2200	J5	C2812	J8	C7525	G5	J3103	H7	N2300	I2	R3411	M6
C		C2813	H6	C7543	F3	J3104	I7	N2301	H3	R3412	N6
C2000	O9	C2814	H7	C7544	F2	J3105	I7	N2600	F9	R3413	N6
C2002	Q8	C2815	H8	C7545	F2	J3110	I8	N3300	O7	R3417	N3
C2003	Q9	C2816	H6	C7547	F2	J3111	J8	N3301	K3	R3418	M4
C2004	P8	C2817	H8	C7548	F2	J3112	I7	N3400	N5	R3419	L3
C2005	Q8	C2818	J6	C7549	F3	J3113	I7	N3401	L4	R4801	D6
C2006	P8	C2819	H8	C7550	F2	J3114	J7	N3402	K4	R4803	D6
C2007	Q8	C2820	I8	C7553	E3	J3115	I7	N4800	E3	R4804	F2
C2008	Q7	C2821	J7	C7580	G8	J3116	I7	N4801	E2	R4805	E2
C2009	Q7	C2822	H6	C7581	G8	J3117	I7	N6050	M3	R6002	M2
C2012	O9	C2823	J8	C7582	G9	J3118	H7	N7505	F8	R6005	O8
C2013	P7	C3100	J8	C7583	G8	J3119	H7	N7520	F5	R7501	F8
C2014	O7	C3300	O7	C7586	G7	J3120	I7	N7540	E2	R7502	G8
C2070	N2	C3302	O7	C7587	F7	J3400	I6	N7541	G2	R7503	G7
C2106	F9	C3303	O8	C7590	E6	J3412	L4	N7590	E6	R7509	E8
C2107	G9	C3304	M8	C7591	E6	J3413	K4	R		R7521	G5
C2111	G9	C3305	N8	C7801	C2	J3418	H6	R2001	O7	R7522	F7
C2112	H9	C3307	K2	D		J3500	Q9	R2002	P7	R7528	E5
C2117	I9	C3308	K3	D2800	I7	J6040	H6	R2003	Q8	R7529	E5
C2118	I9	C3309	L2	D2801	I7	J6041	H6	R2006	P8	R7530	E5
C2119	I9	C3310	K2	D3400	L5	J6042	I6	R2007	P3	R7541	G2
C2120	I9	C3311	L2	D6000	Q3	L		R2009	P3	R7543	F2
C2124	I9	C3312	L3	F		L2001	Q8	R2010	O9	R7544	F2
C2126	I9	C3400	M4	F2000	Q9	L2002	Q7	R2011	O7	R7560	G3
C2127	I9	C3401	N4	G		L2003	P7	R2060	I2	R7800	D2
C2201	I5	C3403	M5	G2200	J4	L2005	P7	R2071	O8	R7801	C2
C2202	H4	C3404	N5	G7501	E8	L2101	G9	R2119	F9	R7810	D3
C2203	I4	C3406	O5	J		L2102	F9	R2121	J9	T	
C2205	I4	C3407	O5	J2005	P4	L2103	F9	R2124	J9	T7502	E5
C2211	H5	C3410	N6	J2006	P3	L2104	H9	R2151	M7	T7580	G6
C2213	I5	C3411	K5	J2007	P2	L2107	H9	R2152	K9	V	
C2215	I5	C3412	M6	J2010	N7	L2110	G9	R2153	K9	V2160	M7
C2216	J5	C3415	M4	J2011	N8	L2111	H9	R2155	M7	V3300	L2
C2217	I4	C3416	N4	J2012	N8	L2202	H4	R2160	M7	V3301	M2
C2220	H4	C3417	L4	J2060	I3	L2205	H4	R2200	I4	X	
C2222	H5	C3418	L4	J2200	I4	L2211	N3	R2210	K7	X2001	Q8
C2225	J5	C3419	K5	J2201	H4	L2212	O3	R2211	K7	X2002	Q3
C2226	H5	C3420	K4	J2202	I6	L2301	H3	R2212	I4	X2061	Q2
C2227	I5	C3421	K4	J2203	I4	L2302	H2	R2300	J2	X2070	O3
C2228	H5	C3422	K4	J2204	H7	L2304	H3	R2303	H3	X2400	L7
C2231	H4	C3424	N6	J2205	H4	L2400	K8	R2400	K8	X2700	E5
C2232	H5	C3425	N4	J2206	I2	L2401	L8	R2401	H4	X3300	N7
C2300	H3	C3428	N6	J2207	I4	L3300	O7	R2402	L8	X3301	P3
C2301	I2	C3429	N6	J2208	I4	L3301	P7	R2600	E9	X3302	P3
C2302	I2	C3500	Q9	J2209	I4	L3302	M8	R2800	I6	X3500	M8
C2303	J2	C3501	N8	J2210	I5	L3303	K2	R2801	H7	X4800	E4
C2304	I2	C3502	N8	J2211	I4	L3400	M4	R2802	H7	X6000	O8
C2307	J3	C3503	O8	J2212	I5	L3401	M4	R2803	J6	X6001	Q7
C2309	H3	C3504	O8	J2213	J7	L3402	K5	R2804	J8	X7800	D3
C2312	J3	C3505	P8	J2214	I6	L3403	L4	R2900	J8	X7801	C3
C2314	I3	C4800	F3	J2215	I4	L3404	M4	R2901	J8	X7802	C2
C2405	K9	C4801	E3	J2216	I2	L3405	N4	R2902	J8	X7803	Q7
C2406	K9	C4803	E3	J2217	J2	L3500	Q8	R2903	J8	X7804	O3
C2407	L8	C4805	E6	J2218	J5	L7500	F7	R2904	I8	X7805	Q2
C2408	L8	C4806	E2	J2219	J3	L7501	F7	R2905	I8	Z	
C2409	M8	C4807	F2	J2220	I4	L7502	E7	R2906	H8	Z2000	P8
C2600	E9	C4808	E2	J2221	I4	L7503	G7	R2907	H8	Z2001	P4
C2601	E9	C6000	P3	J2230	J7	L7506	E8	R2908	J5	Z2002	Q8
C2602	E9	C6001	P3	J2300	I4	L7510	E4	R3300	J6	Z2100	I4
C2700	F6	C6003	P4	J2301	J2	L7526	G6	R3301	J7	Z2403	J9
C2701	F6	C6004	P4	J2302	J3	L7540	G3	R3303	L2	Z2404	K7
C2702	E6	C6005	Q2	J2305	I3	L7550	F2	R3304	L3	Z2405	K7
C2703	E6	C6006	P3	J2306	J2	L7588	E7	R3305	L3	Z2406	K7
C2704	E3	C6050	M2	J2307	J2	L7589	E7	R3308	L2	Z4800	E3
C2800	I6	C6051	M3	J2308	J2	L7590	E6	R3310	L3	Z7501	F6
C2801	H8	C6052	M3	J2700	G6	L7591	G2	R3311	L2	Z7503	F6
C2802	H6	C7500	F8	J2701	G4	L7592	E6	R3312	L3	Z7504	F7
C2803	H8	C7507	E7	J2702	G5	L7802	C2	R3313	M2	Z7521	E5
C2804	H8	C7513	F8	J2703	G5	L7803	C2	R3314	M2	Z7540	E3
C2805	H6	C7518	G7	J2704	G4	N		R3315	L2	Z7541	F3
C2806	I8	C7519	F8	J2800	I9	N2000	Q8	R3320	O8	Z7580	G6
C2807	J7	C7520	F8	J2801	I8	N2001	P8	R3401	N4	Z7582	E7
C2808	I8	C7521	G4	J2803	J2	N2101	H9	R3405	M5		
C2809	J6	C7522	F6	J3100	I8	N2160	M7	R3408	N4		
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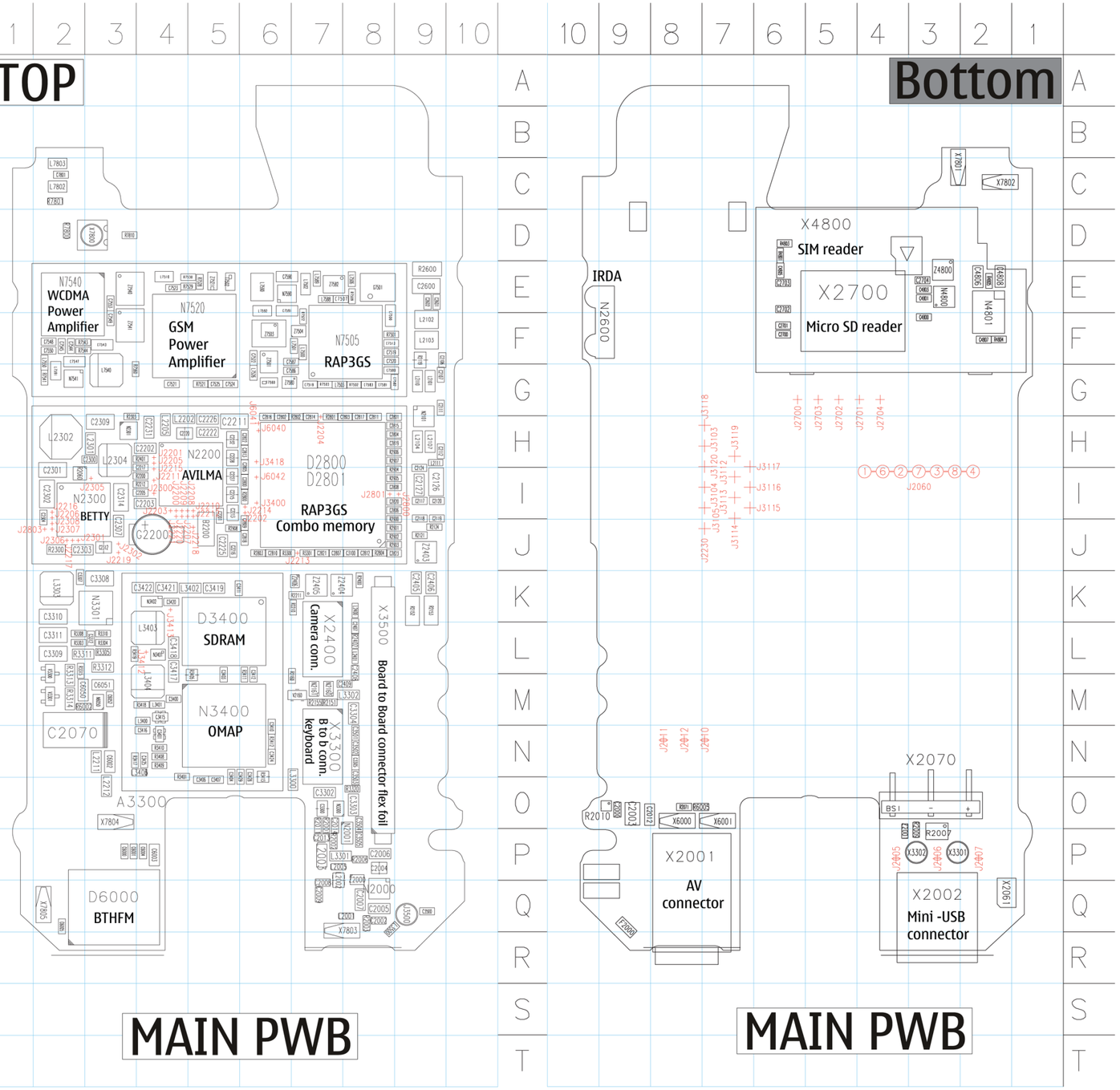

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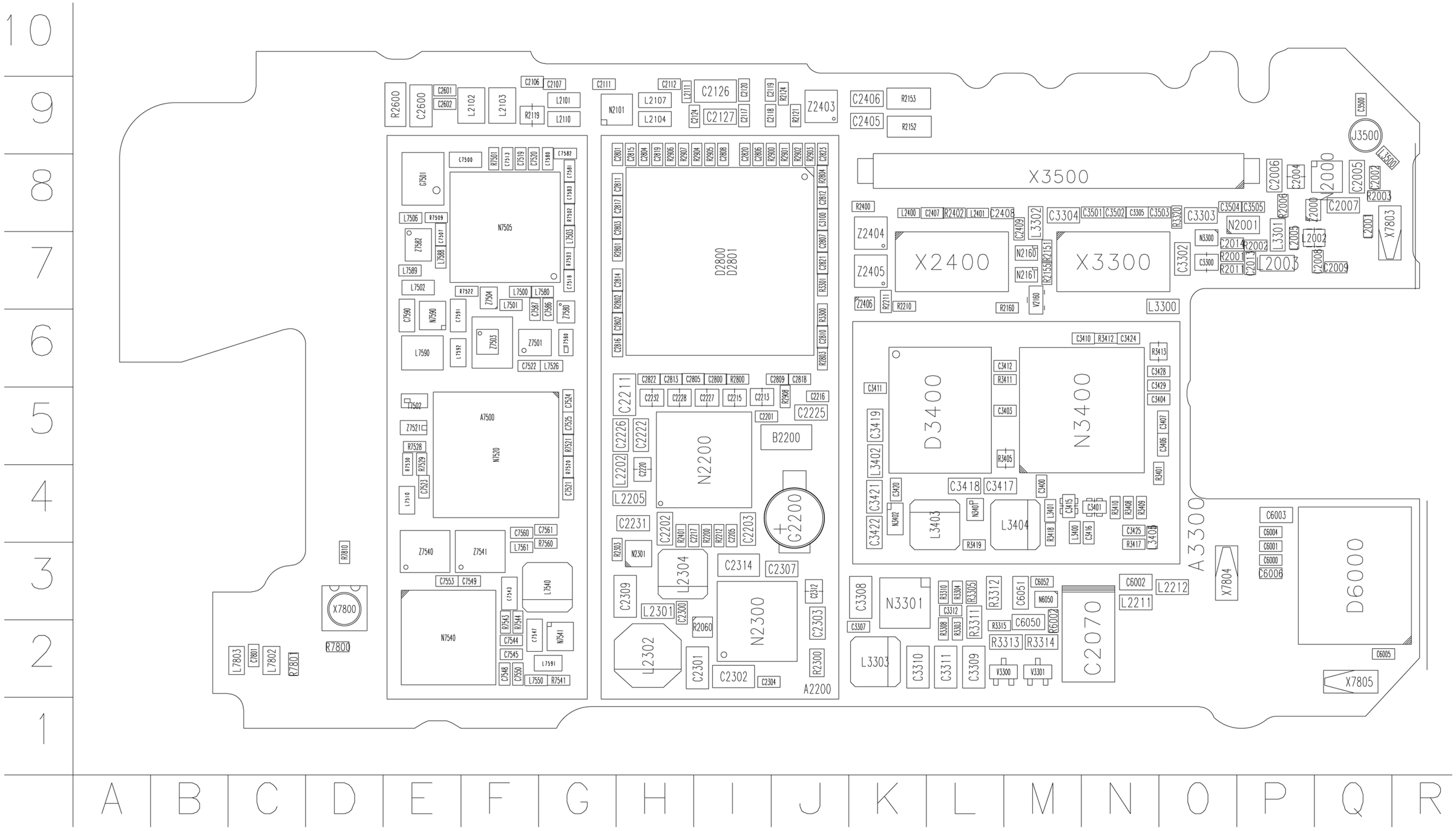
Large scale main board layout, top side (1tma_12a)



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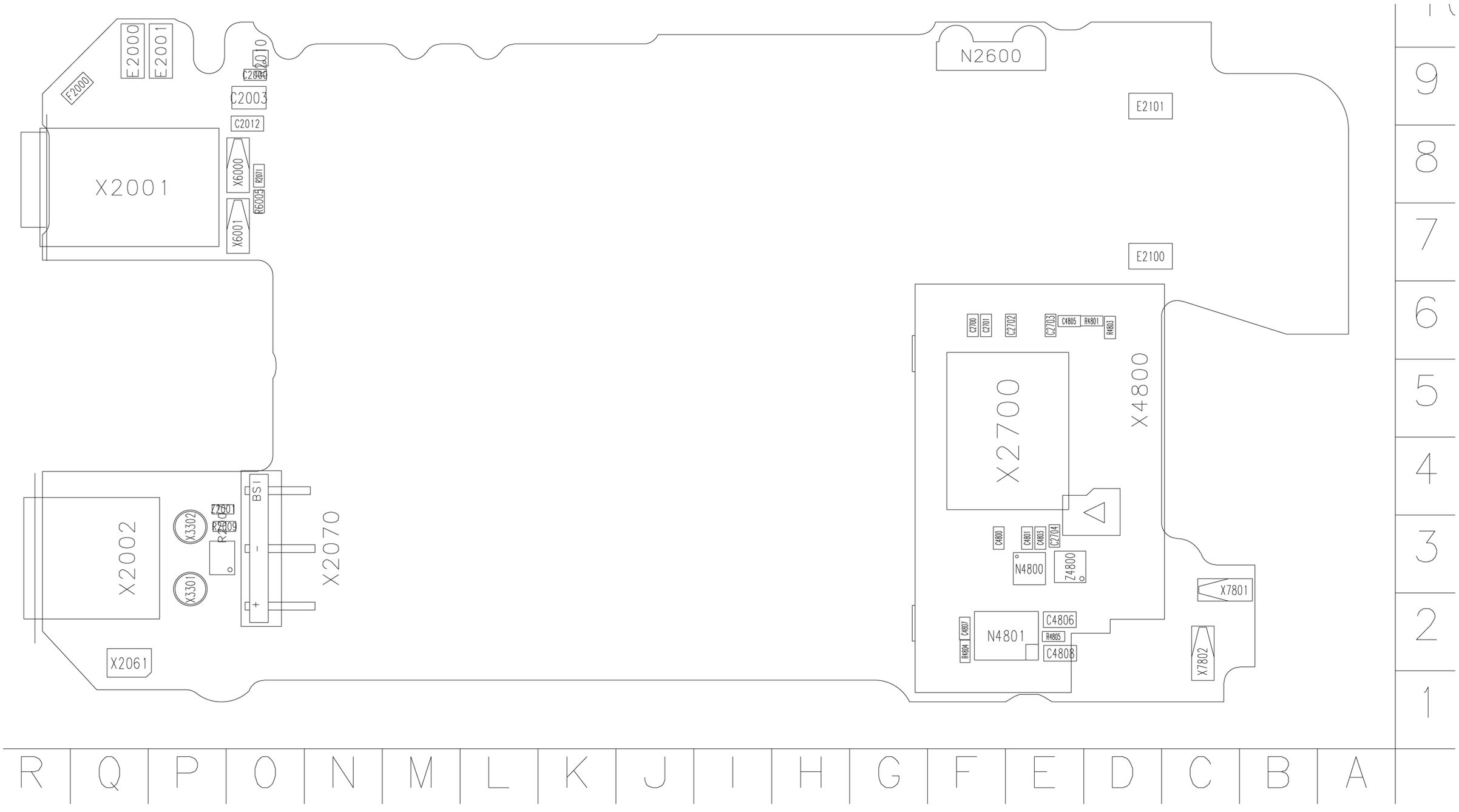
Large scale main board layout, bottom side (1tma_12a)



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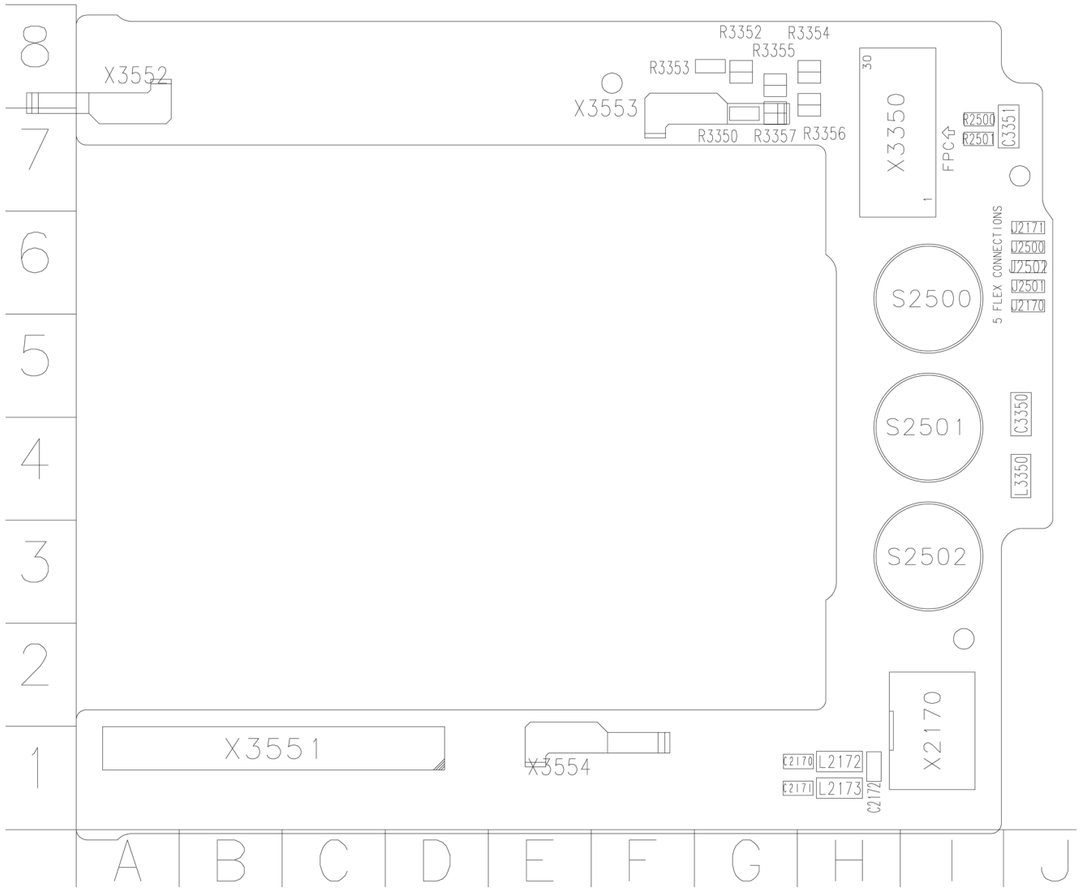
Large scale top board layout, top side (1tmb_04a)



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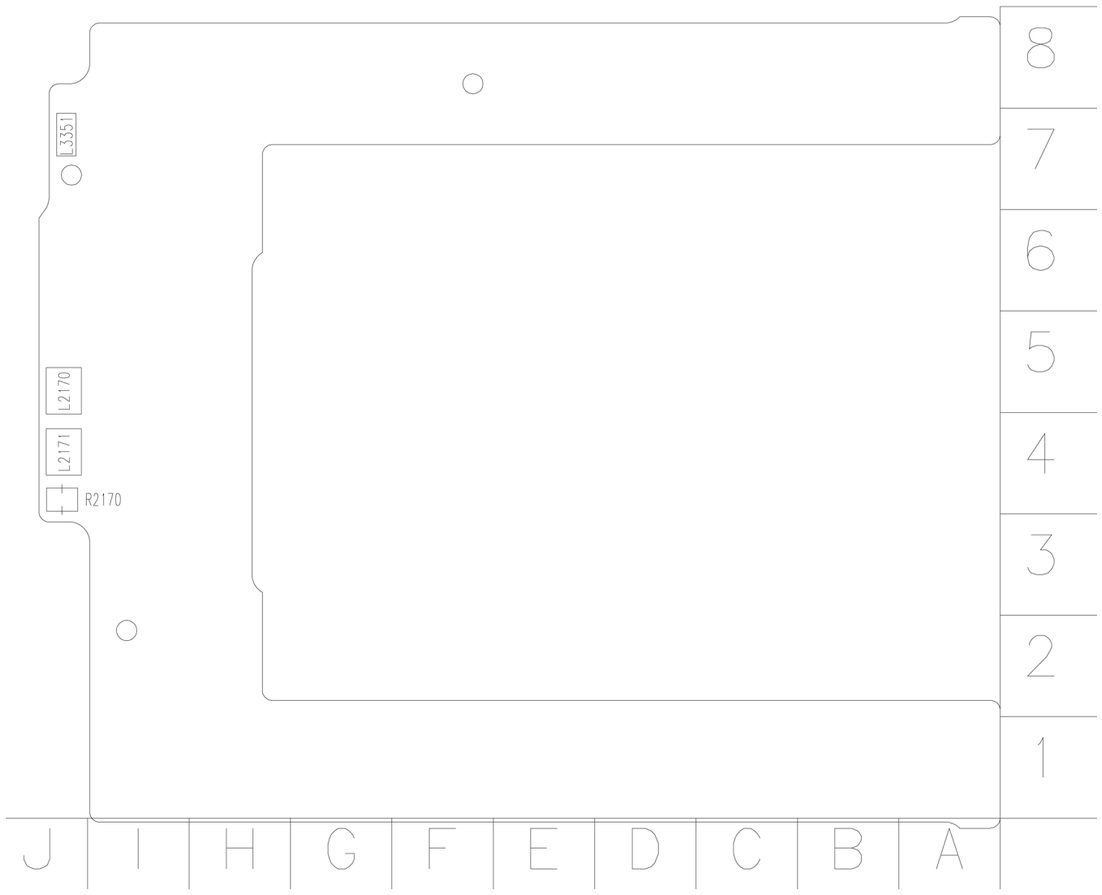
Large scale top board layout, bottom side (1tma_04a)



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Glossary

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A/D-converter	Analog-to-digital converter
ACI	Accessory Control Interface
ADC	Analog-to-digital converter
ADSP	Application DPS (expected to run high level tasks)
AGC	Automatic gain control (maintains volume)
ALS	Ambient light sensor
AMSL	After Market Service Leader
ARM	Advanced RISC Machines
ARPU	Average revenue per user (per month or per year)
ASIC	Application Specific Integrated Circuit
ASIP	Application Specific Interface Protector
B2B	Board to board, connector between PWB and UI board
BB	Baseband
BC02	Bluetooth module made by CSR
BIQUAD	Bi-quadratic ,type of filter function)
BSI	Battery Size Indicator
BT	Bluetooth
CBus	MCU controlled serial bus connected to UPP_WD2,UEME and Zocus
CCP	Compact Camera Port
CDSP	Cellular DSP (expected to run at low levels)
CLDC	Connected limited device configuration
CMOS	Complimentary metal-oxide semiconductor circuit (low power consumption)
COF	Chip on Foil
COG	Chip on Glass
CPU	Central Processing Unit
CSR	cambridge silicon radio
CSTN	Color Super Twisted Nematic
CTSI	Clock Timing Sleep and interrupt block of Tiku
CW	Continuous wave
D/A-converter	Digital-to-analouge converter
DAC	Digital-to-analouge converter
DBI	Digital Battery Interface
DBus	DSP controlled serial bus connected between UPP_WD2 and Helgo
DCT-4	Digital Core Technology
DMA	Direct memory access
DP	Data Package

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DPLL	Digital Phase Locked Loop
DSP	Digital Signal Processor
DtoS	Differential to Single ended
EDGE	Enhanced data rates for global/GSM evaluation
EGSM	Extended GSM
EM	Energy management
EMC	Electromagnetic compability
EMI	Electromagnetic interference
ESD	Electrostatic discharge
FCI	Functional cover interface
FPS	Flash Programming Tool
FR	Full rate
FSTN	Film compensated super twisted nematic
GND	Ground, conductive mass
GPIB	General-purpose interface bus
GPRS	General Packet Radio Service
GSM	Group Special Mobile/Global System for Mobile communication
HF	Hands free
HFCM	Handsfree Common
HS	Handset
HSCSD	High speed circuit switched data (data transmission connection faster than GSM)
HW	Hardware
I/O	Input/Output
IBAT	Battery current
IC	Integrated circuit
ICHAR	Charger current
IF	Interface
IHF	Integrated hands free
IMEI	International Mobile Equipment Identity
IR	Infrared
IrDA	Infrared Data Associasion
ISA	Intelligent software architecture
JPEG/JPG	Joint Photographic Experts Group
LCD	Liquid Crystal Display
LDO	Low Drop Out
LED	Light-emitting diode

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LPRF	Low Power Radio Frequency
MCU	Micro Controller Unit (microprocessor)
MCU	Multiport control unit
MIC, mic	Microphone
MIDP	Mobile Information Device Profile
MIN	Mobile identification number
MIPS	Million instructions per second
MMC	Multimedia card
MMS	Multimedia messaging service
NTC	Negative temperature coefficient, temperature sensitive resistor used as a temperature sensor
OMA	Object management architechture
OMAP	Operations, maintenance, and administartion part
Opamp	Operational Amplifier
PA	Power amplifier
PDA	Pocket Data Application
PDA	Personal digital assistant
PDRAM	Program/Data RAM (on chip in Tiku)
Phoenix	Software tool of DCT4.x
PIM	Personal Information Management
PLL	Phase locked loop
PM	(Phone) Permanent memory
PUP	General Purpose IO (PIO), USARTS and Pulse Width Modulators
PURX	Power-up reset
PWB	Printed Wiring Board
PWM	Pulse width modulation
RC-filter	Resistance-Capacitance filter
RF	Radio Frequency
RF PopPort TM	Reduced function PopPortTM interface
RFBUS	Serial control Bus For RF
RSK	Right Soft Key
RS-MMC	Reduced size Multi Media Card
RSSI	Receiving signal strength indicator
RST	Reset Switch
RTC	Real Time Clock (provides date and time)
RX	Radio Receiver

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SARAM	Single Access RAM
SAW filter	Surface Acoustic Wave filter
SDRAM	Synchronous Dynamic Random Access Memory
SID	Security ID
SIM	Subscriber Identity Module
SMPS	Switched Mode Power Supply
SNR	Signal-to-noice ratio
SPR	Standard Product requirements
SRAM	Static random access memory
STI	Serial Trace Interface
SW	Software
SWIM	Subscriber/Wallet Identification Module
TCXO	Temperature controlled Oscillator
Tiku	Finnish for Chip, Successor of the UPP, Official Tiku3G
TX	Radio Transmitter
UART	Universal asynchronous receiver/transmitter
UEME	Universal Energy Management chip (Enhanced version)
UEMEK	See UEME
UI	User Interface
UPP	Universal Phone Processor
UPP_WD2	Communicator version of DCT4 system ASIC
USB	Universal Serial Bus
VBAT	Battery voltage
VCHAR	Charger voltage
VCO	Voltage controlled oscillator
VCTCXO	Voltage Controlled Temperature Compensated Crystal Oscillator
VCXO	Voltage Controlled Crystal Oscillator
Vp-p	Peak-to-peak voltage
VSIM	SIM voltage
WAP	Wireless application protocol
WD	Watchdog
XHTML	Extensible hypertext markup language
Zocus	Current sensor, (used to monitor the current flow to and from the battery)

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